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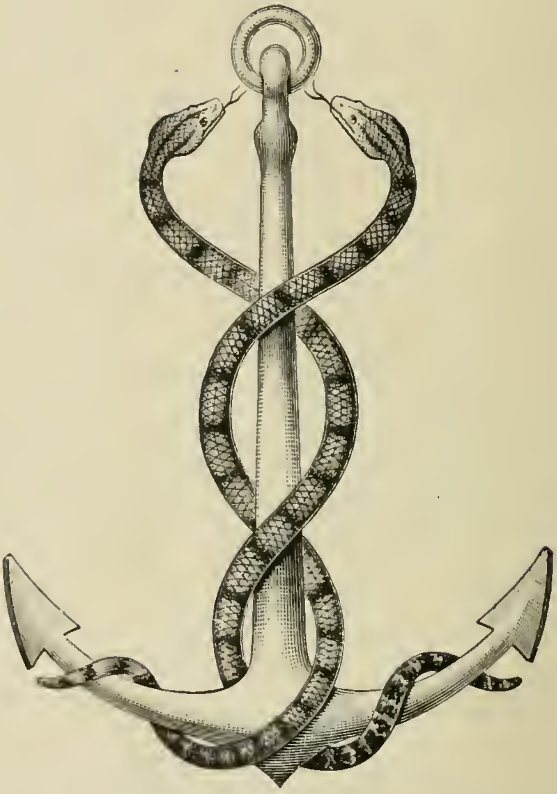
THE
EDINBURGH MEDICAL JOURNAL.



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Per.

THE EDINBURGH MEDICAL JOURNAL

EDITED BY

ALEXIS THOMSON, M.D., F.R.C.S.Ed.

AND

HARVEY LITTLEJOHN, M.B., F.R.C.S.Ed.

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THE

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THE year which has passed has left us in its closing days to mourn the loss of men whose lives have been striking examples of that *perfervidum ingenium Scotorum* which should be at once our pride and example.

First, the master mind, the great Conqueror of the Mysteries of Science, Lord Kelvin, has departed, full of years and covered with the immortal glory of his victories. Then, from our own immediate midst, almost at one fell swoop, death has carried off two of those whose lives and work have been devoted to the highest interests of the great Medical School of Edinburgh in a manner which has added to its reputation and maintained the great traditions of the past.

The names of Thomas Annandale and Patrick Heron Watson have been household words to generations of students of our School. In both, when they fought in the forefront of the fray with the ever-advancing banner of Surgical Science, the student saw the skilful leader, the experienced commander; and in both, amidst every variation of fortune, in reverse as in success, he beheld exemplified in them the great lessons of devotion, dignity, and unfailing courtesy.

Little time has been afforded us to do justice in the following paragraphs to those whose loss we so deeply deplore. We realise, however, that long after our words have been read and forgotten, the remembrance of what they were and what they did for good with high-minded purpose will remain fresh and undimmed by time.

Professor Annandale. THOMAS ANNANDALE, Regius Professor of Clinical Surgery in the University of Edinburgh, passed away in his sleep on the morning of Friday, the 20th December. Although in his seventieth year, he had discharged his Infirmary duties with his usual briskness and cheerfulness up to the day before, so that the news of his sudden death was the more startling. For some time back those accustomed to work with him in Hospital had noticed an occasional bluish tinge about the lips and a desire to rest after a specially arduous operation, but he never complained or shirked. One can well imagine it was his wish to die in harness, and that he would not have willed it other than it proved to be.

His brilliant career may be sketched briefly as follows. Born in Newcastle and apprenticed to his father in that city, he became a student at the Edinburgh University, and graduated in 1860, obtaining a Gold Medal for his thesis. He was appointed House-Surgeon and later Private Assistant to Professor Syme; this latter appointment was the turning-point in his career, and determined him to follow in the footsteps of his great master. In course of time he became Assistant-Surgeon and Surgeon to the Infirmary, and a Lecturer on Surgery in the Extra-Mural School; and when, on Lister's retirement in 1877, the Chair of Clinical Surgery fell vacant, he was elected Regius Professor, and occupied this distinguished office for thirty years. He was not a voluminous writer, but mention should at least be made of his monograph on "Injuries and Diseases of the Fingers and Toes," for which he was awarded the Jacksonian Prize by the Royal College of Surgeons of England.

As a Professor, he, more than any one, identified himself with the interests of the students of the University, and he grudged neither trouble, time, nor money in promoting schemes for their welfare. To him they were in large measure indebted for the initiation and completion of the Union and for the acquisition of the Athletic Field at Craiglockhart.

From the earliest days of his apprenticeship Annandale showed a love and aptitude for the practice of Surgery, which he retained to the last day of his life. It was at the same time his work and his relaxation. He might come to the Hospital tired and out of sorts; he would leave it refreshed in mind and body. It may be said that operating was a pleasure to him, and that the University Clinical Wards represented to him what was best in life. He possessed to the full what has been traditionally regarded as "the surgical instinct." He diagnosed a case quickly and intuitively; he decided at once on the necessary treatment, and was always keen to carry this out without delay. His manipulative skill was proverbial, and his coolness and resource in emergencies always excited the admiration of his assistants and students. He never showed hesitation, and we believe that he never knew what it was to be nervous. The instance may be quoted when the *élite* of surgeons of both Worlds met at Philadelphia, the operation on an aggravated case of retro-pharyngeal tumour was offered to and declined in turn by Esmarch and the late Sir William MacCormack; Annandale accepted with alacrity, and successfully carried out the operation under difficulties which few men in these days would have faced and surmounted.

His teaching was practical and of the greatest value to young men going into practice; it lacked, however, the scientific spirit and oratorical power. The rapidity with which he attained eminence in his early years was due in part to his association with Syme, in part to his capacities as an operating Surgeon, and in part to his confining himself to the practice of Surgery when his chief rivals were combining this with the practice of Medicine.

We are indebted for the following tribute to his oldest and most intimate friend, Frederick Page of Newcastle:—

"Annandale had a singularly charming personality. He was certainly the most reliable man it has ever been my good fortune to know. If he made an appointment you knew that it would be kept punctually. If he said a thing you knew he would repeat it under any circumstances, if it were necessary to do so, without the slightest variation or hesitation. He never, I am sure, undertook or promised to do a thing that he did not perform, if it were possible, irrespective of any inconvenience to himself. No one who knew him, however casually, ever had the slightest doubt as to his sincerity, his transparent honesty and straightforward manliness. One might expect, pardonably perhaps, that a man of such pronounced character would be a stern, even a hard man. He was neither. He could be severe on occasions, but these seldom arose in his intercourse with others. A kinder, more sympathethic and gentler nature than his there could not be. In the Hospital he was beloved by his patients—men, women, and children. His presence in the wards was like a ray of sunshine. The kind word here, the encouraging nod and inquiry there, brought a smile to the face of even those who knew their days were numbered. His nurses were one and all his trusted colleagues, his students his devoted friends,—all these are the poorer for his death. Every cabman, tram-conductor, and policeman in the city greeted him respectfully,—he seemed to be on intimate terms with them all. This man had been his patient in the Infirmary—that one, an old Gordon Highlander, had been helped out of some scrape or other by the Professor. If you walked along Princes Street with him, almost every second person you met acknowledged his salute. There was no better known man in Edinburgh. A keen fisherman, a splendid pedestrian, and a great admirer of nature,—it was a real pleasure to be with him while he was engaged either in work or recreation. His sense of duty and his courage were admirable. Both were severely tested some years ago, when, owing to a serious and most painful illness, necessitating several severe operations, he struggled on at work for months longer than most men could or would have done. In his own house he was a devoted husband, an affectionate and indulgent father, never so happy as when surrounded by his family. He was a model host, hospitable, genial, glad to see his friends, of whom he had a large circle about him. He lived for seventy years a useful life, and died in harness, a painless, peaceful death. We who are the losers may well envy such a brilliant and blameless career."

Patrick Heron Watson. It can scarcely be said that the death of Sir Patrick Heron Watson was unexpected. For many months he had been an invalid, and latterly was very seldom out of doors. Within the last few days of his life the illness from which he had been suffering—angina pectoris—gave rise to serious alarm, and on Saturday, 21st December, he breathed his last.

It is given to few in our profession to live a life more eventful, more strenuous, and more successful. By his death an essentially strong man, a man who would have been eminent in whatever path of life he had followed, has been taken away. He possessed a striking individuality, and in the practice of his profession he attained a success which few if any in Scotland have ever before exceeded.

Born a son of the manse in 1832, his father being the Rev. Charles Watson, parish minister of Burntisland, he spent his boyhood attending a school well known in those days—Circus Place School. Afterwards he went to the Edinburgh Academy and the University, where, in 1853, P. H. Watson received the degree of M.D. Two years later he became a Fellow of the Royal College of Surgeons of Edinburgh, and at the time of his death he was, with one exception, the oldest surviving Fellow resident in Scotland.

After acting as House-Surgeon in the Royal Infirmary under Mr. Spence, Dr. Watson, it has been said, with an eye to the Professorship of Military Surgery, then held by Sir George Ballingall, determined to join the Army Medical Service. At Woolwich, where he was stationed, he at once showed his aptitude for Surgery, and conducted a class of Operative Surgery. Another Edinburgh surgeon, Dr. Richard MacKenzie, had also decided to acquire experience with a view to the Chair of Military Surgery, and at the outbreak of the Crimean War he proceeded to the front, only, however, to die of cholera after the battle of the Alma. Dr. Watson, who followed him to the Crimea, was more fortunate, since, although twice struck down by illness, he passed through the campaign, and received as a reward for his services the Crimean, Turkish, and Sardinian medals.

On his return to Edinburgh he settled down to general practice, and lived in Hope Street. He married the daughter of Professor Miller, and when he died Dr. Watson succeeded to his large and lucrative practice. This gave him a great step, but his rapid advance was largely due to his own industry and undoubted capabilities.

He lectured with great success at Surgeons' Hall upon Surgery, and was on the Staff of the Royal Infirmary, besides being Surgeon to Chalmers' Hospital, to which he was appointed on the death of his father-in-law, Professor Miller. From this period onwards his reputation as a teacher and as an unusually skilful and bold Surgeon continued to grow, and all the most coveted honours which are open to members of the profession became his. He was elected President of the Royal College of Surgeons of Edinburgh in 1878, and his selection a second time, in 1905, on the occasion of the Quater-Centenary of the College, was a signal proof of the estimation in which he was held by the Fellows. His Alma Mater conferred the honorary degree of LL.D. on him in 1884, while in 1882, and for twenty-five years thereafter, he represented the College on the General Medical Council. He was appointed one of the Honorary Surgeons in Scotland to Her Majesty Queen Victoria, and in 1903 received the honour of knighthood. These and many other honours came to him, and none will deny that they were richly deserved, and that he worthily fulfilled the trust placed in him.

It is not an easy task to sum up within the compass of a few paragraphs a man such as Sir Patrick was. In his profession he was at one time, what we suppose we shall never see again, *facile princeps* in the practice of both Surgery and Medicine in Scotland. Without doubt a bold, brilliant operator, whom nothing appalled and who commanded to an unusual degree the confidence of his patients, he was no less a Physician whose advice was sought for by persons from all parts of the country. For a considerable time he was the fashion, one might say, and it was wonderful how he was able to overtake the arduous work of his immense practice.

This attitude of combining the practice of Medicine and Surgery undoubtedly conduced to what must have been to a man of his gifts and eminence a bitter disappointment, his defeat for the Chair of Surgery, rendered vacant by the death of Professor Spence. But if he felt the defeat, he did not show it, and herein exemplified one of his most characteristic traits—absolute imperturbability. Nothing could apparently ruffle his composure—no strain or test broke it down; outwardly he was always the same—sedate, urbane, decisive. Under all this, however, we know that there was a warm, generous heart, a kindly feeling to all who sought his help, be they patient, friend, or student. There must be many of the latter who, scarcely daring to speak their petition for a testimonial, were yet surprised and delighted to receive by the next post all and more than they ever hoped for, written in faultless caligraphy and expressed in the kindest terms.

He was a great Surgeon, as surgeons were a quarter of a century ago; he was a great Physician, judged by the ordinary standard of general practice; and he was a strong, cultivated, far-seeing man of affairs, who did much to uphold the traditions of the Edinburgh School of Medicine.

Lord Kelvin's Influence upon Physiology.

The advances which have been made in physical science, and the practical applications of its laws to commercial and everyday requirements, have been so numerous of late years, that it is difficult to realise how much we owe to the man who has been the pioneer and leader of scientific thought during the last half-century. Lord Kelvin's work is so great and far-reaching, that there is hardly any branch of science which has not experienced the benefit of his influence. Helmholtz was a great physicist who devoted his ability largely to the solution of problems in physiology. Lord Kelvin's talents were employed in wider fields, but he alone rendered possible the building up of that great and growing subject of electro-physiology. The difficulty of detecting the feeble electric currents at the end of the Atlantic cable in 1857 was overcome by the invention and perfection of the mirror galvanometer. A similar difficulty confronted the physiologist in the investigation of the currents produced by living tissues. The barrier was removed by Lord Kelvin. The mirror galvanometer furnished the means of detecting and measuring the most minute electric currents, and has been the favourite instrument of physiologists for the last fifty years. Lippmann's capillary electrometer, and more recently the string galvanometer in the hands of Einthoven, have also played a part in electro-physiology, but Lord Kelvin's galvanometer retains its place of honour. Its details and mode of employment form the basis of the study of that part of physiology; a knowledge of it is absolutely essential to the student before he can understand the problems it unfolds. The electrical changes accompanying vital activity, whether manifested in the passage along a nerve of a nerve impulse, in the contraction of muscle, or in the process of secretion by glands, have alike been investigated by the use of the mirror galvanometer, and the nature of the processes involved in these phenomena has thereby been greatly elucidated. The whole domain of electricity and magnetism has been brought by him into the position of a science, subject to mathematical calculation of its forces.

The law of the conservation of energy, and the relations between heat and work, were placed upon a sound footing by Lord Kelvin; his conceptions have in this respect influenced workers on the physiology of muscle. Thermo-electricity was also better understood from his researches; while spectrum analysis engaged his attention at an early date, and many discoveries attributed to Bunsen and Kirchoff were anticipated by him.

It is impossible to find any subject in which physical laws are brought into relation with physiology that has not been more or less influenced by Lord Kelvin's work, and the scientific world loses in him one of its greatest exponents.

ORIGINAL COMMUNICATIONS.

CLINICAL OBSERVATIONS ON SOME OF THE RARER VARIETIES OF VESICULAR AND BULLOUS AFFECTIONS OF THE SKIN.

By W. Allan Jamieson, M.D., F.R.C.P.Ed., *Knight of Grace of the Order of St. John of Jerusalem, Consulting Physician for Diseases of the Skin, Edinburgh Royal Infirmary.*

It is often alleged as a grievance against the dermatologist, that he is too fond of multiplying names for what some might call anomalies of existing diseases, or at least to attach to a freshly isolated kind, an unpronounceable appellation. As in the case of most other general statements, there can be found the traditional grain of truth underlying the averment. Yet it is questionable if a real hardship can be proved, provided that the relationship of the newcomer to older and more familiar members of the group be clearly specified. The more precise our knowledge becomes, the easier the diagnosis, and exactitude is impossible apart from subdivision. In the instance of the ailments under review, it is not very long since bullous diseases of the skin included only pemphigus and rupia, though even then it was admitted that there might occur a bullous phase in the course of disorders in which the bleb was not an inherent characteristic. The vesicle in like manner, seeing that it is only a small bleb, may be encountered under somewhat unexpected circumstances. It may therefore prove interesting and possibly instructive to relate, along with some brief comments, a few examples of the rarer varieties of vesicular and bullous conditions which have from time to time come under my notice.

Probably the earliest described and certainly the most familiarly known of vesicular affections is herpes zoster. As usually seen, we have in it a series of grouped vesicles seated on an erythematous base, encountered on any part of the body, but arranged at intervals along the course of the peripheral distribution of one or more cutaneous nerves. Zoster seldom departs from this type form, and hence as a rule it is readily recognised. The deviations are mainly limited to the degree of development reached by the elements themselves. Thus the stage of vesiculation may never be attained, progress having been arrested at the papular grade. Or, on the contrary, the advance may be so considerable that hæmorrhage ensues, or gangrene supervenes. No doubt if the eruption is restricted to a single cluster, and this is placed on an unlikely locality, as the pinna of the ear, or concealed under the hair on the scalp, there may be difficulty in determining its nature. The rarest modification is that where not merely one site, but a wide extent of surface is involved, and it is yet more uncommon when the efflorescence is symmetrical as well as widespread. The following is an instance of this very exceptional manifestation:—

Case 1. *Anomalous herpes zoster.*—S. M., a mason's labourer, was admitted to my ward in the Royal Infirmary on the recommendation of Dr. Johnston, 1 Buccleuch Place, on 7th December 1905. He was an unmarried man in the enjoyment of good health. A fortnight previously he had suffered from headache and pain in the shoulders, which lasted for about a week, and for which he had treatment. A week later an eruption of small vesicles appeared in the bend of the left elbow, then almost at the same time at the back of the left axilla, and immediately after in front of it. The following day the right axilla and bend of the elbow were similarly affected, and, finally, several groups of vesicles came out on the lower part of each flank, extending diagonally downwards over the crest of the ilium into the groin. The eruption consisted at first of clusters of small vesicles on an erythematous base, but in the axillæ the groups became confluent.

On admission, the whole of both axillæ, advancing 1½ in. behind, for 3 in. in front, and reaching vertically down for 5 in., was of a pale pink colour, with a well-defined margin. At the edge of this were numbers of shot to small pea sized transparent vesicles. Within this was an area where the walls of the vesicles had ruptured, and, having become partially detached, gave rise to flaky, yellowish-white crusts. Within this ring the surface was dry, red, and smooth. Beyond the lower margin were isolated outlying vesicles. Beginning at the crest of each ilium, separate groups of vesicles on an erythematous base, some of which contained blood, exactly like those seen in hæmorrhagic zoster, extended diagonally downwards. There were five groups in all on each side. In the bend of each elbow were five or six vesicles, and also one or two lower down the arm on the flexor aspect. The symmetry was absolute. The eruption itched slightly at first, but there was no pain of a precursory kind in the parts, with exception of that in the shoulders mentioned above, where, however, no subsequent eruption appeared. Boric starch poultices were applied. On 11th December the surface everywhere had become clean and smooth, and there were no vesicles visible. The temperature since admission had been quite normal. The skin was now kept smeared with an ointment of oxide of zinc made up with vaseline, and soon after he was discharged well.

Built somewhat on the lines of zoster as regards grouping, but still entirely distinct, is the erythemato-bullous disease to which Duhring, who first isolated it, has attached the name of dermatitis herpetiformis. The term may not be fully descriptive, yet it is preferable to any of the proposed substitutes. It is doubtful, however, if it is the same complaint as the pemphigus pruriginosus of Kaposi, as the severe itching described by him seems part of an ailment more grave in character than dermatitis herpetiformis usually is. In dermatitis herpetiformis the general health commonly suffers little, but there are occasional cases where the process does exert a malign influence. Such are certainly seldom encountered, but the following one shows that in exceptional circumstances a profound effect on the constitution may manifest itself in its course.

Case 2. *Dermatitis herpetiformis of unusual severity.*—M. W. had passed her life in comfortable circumstances as a housekeeper, and though now over 50, the menses were still present but becoming irregular. She had scarcely ever known what it was to be ill, but three weeks before I first saw her on the 29th October 1906, when in England she had partaken of food different to what she was accustomed to, and had eaten more pastry than she liked. The earliest appearances she was conscious of were the eruption of blotches on her skin, large reddened areas and hardish knots on her hands and arms. These faded only to reappear. There were then no blebs, which were a later manifestation. The red and œdematous condition of the entire integument at once struck one as peculiar. The legs in particular presented a dull crimson hue. Scattered over were numerous clear and tense bullæ, some quite small, others fairly large. These were both isolated and here and there in groups. There were likewise thin and thicker crusts, dark in colour, the remains of previous bullæ which had ruptured. There was much itchiness, and the skin was extensively excoriated. She did not feel ill, though the state of the skin necessitated her being in bed. The appetite was good, the tongue fairly clean, and there were no blisters inside the mouth. The bowels were constipated and were regulated by salines. The temperature when seen in consultation in the country in the forenoon was 101°·8, the pulse 90 and soft. She was given arsenic and cinchona internally, and the skin was directed to be bathed or sponged with dilute Condy's fluid, and painted with an oleo calcareous lotion, a modification of Carron oil.

When seen again on the 26th November the redness of the skin had considerably lessened, and was then dry and rough, but did not show any moist places left by bullæ. It still exhibited much evidence of scratching. The condition of the legs was worse than that of the arms, possibly as being more accessible to the nails. At the time there were few blebs or vesicles to be found, and in particular no large ones. The temperature has varied between 100° at night and 99° in morning. The pulse averages about 85; the tongue was clean and the appetite fair. The itchiness disturbed her sleep. In the interval she had various lotions and tonics. She was now sponged with warm boric acid solution, and Lassar's vaseline starch paste containing 1 drm. of ichthyol to the ounce rubbed in twice daily, while 10 grs. of the natural salicylate of soda, well diluted, was given three times a day. Oranges were also added to her simple diet. Alterations were from time to time made in the details of treatment till the 8th March 1907, when she was again seen. For a month she had taken 5 grs. of the hydrochlorate of quinine in place of the salicylate, and the skin had now a soddened appearance in place of being dry as heretofore. It had a dirty greyish aspect, and the palms of the hands resembled those of a washerwoman, the epidermis being swollen and soggy. All over the body the skin was œdematous, and she perspired readily. There were pretty numerous small vesico-pustules scattered over the surface, subepidermic in situation, and abrasions, but no large bullæ.

As no marked improvement took place in her condition, she was admitted on 21st May to a home in Edinburgh, and remained there under my observation for two months. Her skin on admission was an ashy grey colour, felt and looked œdematous, and from its somewhat moist surface exhaled a peculiar, rather nauseous odour, though for a period it had been sponged three times a day with diluted sanitas oil. Closely inspected, it showed a greyish mottling, with many scratch marks and excoriations. Here and there were found blisters and vesico-pustules. The hands could be opened and shut with difficulty, and the epidermis was yellow, thickened, and verrucose, something like that seen in tyloma, but less smooth. The integument sweated readily, and was itchy all over. Blisters came out frequently, and occasioned much pruritus till they broke or were torn. The tongue was clean and the appetite really quite good. The urine had a specific gravity of 1008, was acid and contained no sugar or albumin. The temperature varied between 99° in the morning to about 101° at night. The pulse was weak and compressible, ranging from 88 to 96 or 100. Her diet was kept plain and unstimulating, with vegetables and fruit and a fair quantity of milk. The natural salicylate of soda was contained in 10-gr. doses, a pill containing $\frac{1}{100}$ gr. of sulphate of atropia given at bedtime, while the bathing the skin with dilute sanitas oil was persevered with, as she found it grateful and refreshing, combined with inunction with Lassar's paste to which ichthyol in the proportion of a drachm to the ounce was added.

A few days after her admission, Dr. Lovell Gulland made an examination of her blood, and reported as follows:—

Leucocytes, 18,000, of which—

Eosinophile . . .	45	per cent.
Polymorphs . . .	38	,,
Lymphocytes . .	17	,,
	100	,,

Normals being 1, 70, 29 respectively or thereabouts.

The increase works out even more strikingly if one takes the total number of the different varieties per c.mm.—

	Normal.	Case in Point.
Eosinophile	70	8,100
Polymorphs	4900	6,840
Lymphocytes . . .	2030	3,060
	7000	18,000

The polymorphs and lymphocytes are not greatly altered, while the eosinophile increase is enormous. "I think I have only once seen a higher count."

About a week later, Dr. Gulland made another examination, and found that while the total number of leucocytes was much less, only about 12,000, the eosinophile proportion was as high as before. Her general appearance struck him as that of one much better.

For four weeks from the 10th June till the 8th July she had iron in the form of the tincture of the perchloride, arsenic, and strychnia. The atropia was persevered with all the time she remained in the home, as when a night for purpose of observation was allowed to pass without it, she perspired much more. On the 9th July the iron and arsenic mixture was discontinued, and in place of it she was given milk treated with anticolin, a pure lactic ferment, prepared by Raimes, Clark, & Co., and she took this steadily, not only all the time she remained in Edinburgh, but for a month after her return home.

On 2nd August, the day before she left, it is noted that the skin is now soft, but still too moist, and during the daytime she perspires too much. It exhibits the same ashy grey colour, though less œdematous in texture. But few vesicles now come out, mostly at the margins of the axillæ, hardly any on the arms and legs. The itching is much less aggressive, and of all the applications tried the Lassar's paste with ichthyol is the one which imparts the greatest sense of comfort. As a result of washing for several weeks with resorcin and salicylic acid soap, the palms are fairly smooth, the hands can be flexed and extended readily, while the nails look more natural. The temperature has for weeks been normal in the morning, and very seldom has risen above 99° at night. The pulse varies from 84 to 96, and is stronger. The appetite is excellent; she likes the anticolinised milk, but the bowels still tend to constipation. As a rule, she does not perspire during the night, which she, probably rightly, ascribes to the atropia pill.

Six weeks later, in the middle of September, she was again seen at home. The improvement was maintained, so that she was able to go about the house, and indeed shortly after was so well as to pay a visit to friends a long distance off.

The foregoing must be regarded as a very severe example of dermatitis herpetiformis, not so much from the size or multitude of the vesicles, as from the intense implication of the skin as a whole. The special localisation was not quite so pronounced as one might reasonably have expected. While the anatomical situation of the vesicles may be immediately beneath the epidermis, they are, in my experience, most commonly placed within the structure of the rete mucosum, and this points to some disturbance of the vegetative epithelial layers. The action ascribed to arsenic as exerting a restrictive effect in its treatment, favours this view. Arsenic was, however, carefully tried in this case both before she came under my care and while in the home. Yet one cannot say that the improvement which undoubtedly occurred could be fairly attributed to that drug. It is conceded that arsenic has a powerful influence on epithelial transformation. This is shown among other illustrations, by its efficacy in lichen and in psoriasis, in both of which diseases it has proved beneficial in suitable cases. This is further manifested by its capacity, when pressed or when continued for too long periods of time, in giving rise to unhealthy forms of keratinisation, leading finally to epithelioma. One cannot help contrasting this with the X-rays and radium. These act alike on epithelial and connective-tissue anomalies, and can also, if pushed, lead to the development of cutaneous cancers. While in the more ordinary instances of dermatitis herpetiformis, arsenic, so long as it is being taken, checks in great measure the evolution of fresh vesicles, and moderates the pruritus, its effect in these directions was but little apparent here. It is almost a canon in medicine that for the full result to be obtained from remedies, the earlier in the course of the disease they are given, the more amenable to them does it prove. But besides this there occur severe and intense forms which pass beyond the ordinary rule, and drugs which at an earlier stage would have been expected to prove helpful if not curative, are of little use, inasmuch as profound tissue changes have already set in.

The prevalent view of the underlying pathological process is that expressed by Pusey, "that it is a vasomotor disturbance, probably of central origin." He holds that this is in most cases of purely nervous origin. Yet no one has so far demonstrated any definite nerve lesions. It has been suggested that the presence of toxins in the blood may serve to evoke it. The absorption of leucomaine poisoning from the intestines has been postulated. This led me to try anticolin. This is a pure lactic acid ferment credited with the property of inhibiting the action of undesirable bacterial flora in the intestine. by Messrs. Raimes, Clark, & Co., its introducers. It is said to reinforce, in the alimentary canal, those bacteria known to be present normally, and known to be harmless. "Experimental and clinical evidences point to the conclusion that the development of these harmless bacteria results in the vanquishing of the *Bacillus coli* and other more dangerous organisms." Here again it was difficult to say how much of the gain in health which was apparent and progressive during the exhibition of the anticolinised milk, was attributable to it or to the vis medicatrix naturæ, which had been allowed free play. The anticolinised milk proved agreeable as a beverage, was taken readily, was well digested, and caused no inconvenience or untoward consequences. In a milder case it might be tried with a fair prospect of benefit. It should be added that anticolin was introduced to my notice by Mr. Alexander, the able and well-informed dispenser to the Edinburgh Royal Infirmary.

This is supported by the statements of Metchnikoff,[1] who has devoted two chapters to the subject, and in these emphasises the "great importance of lactic fermentation as a means of stopping putrefaction and butyric fermentation, both of which hinder the preservation of organic substances, and are capable of exciting disturbances in the organism." He suggests its employment to arrest putrefaction within the digestive tube. "I think, therefore," he concludes, "that lactic bacteria can render a great service in the fight against intestinal putrefaction."

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[1] "The Prolongation of Life," London, Heinemann, 1907.

In dermatitis herpetiformis the vesicles may be scattered, but are more usually distributed in groups, and in these the individual elements may be pretty closely aggregated. But in that rare form of bullous disease called pemphigus foliaceus, the imperfectly formed blebs encroach so closely on one another that they run together, and lead to the constant exfoliation of epidermic particles agglutinated into flaky masses. The cause of this type of pemphigus is quite obscure, nor is it pretended that any additional light is thrown on its etiology from the case to be related.

Case 3. *Pemphigus foliaceus.*—R. W., æt. 28, a native of Fife; has been employed as an assistant in a baker's shop. Previous to this she lived at home, but, becoming dissatisfied with the quietude there, she went into the shop. She remained there for five years, but stopped work a month before her admission to the Royal Infirmary on 29th August 1905. She never did any baking either at the shop or at home. Her food was good and abundant, but seldom ate sweets or pastry. She indulged in tea four times daily. The bowels and periods are regular. She has been treated for bloodlessness three or four times altogether, and twice within the last five years while at the shop. Her last attack was about Christmas 1904. All the attacks were mild, ambulant, and cured in two or three weeks. She has had no other illnesses since childhood, except influenza,—one bad attack seven years since. Both her parents are alive, and they, as also two brothers and one sister, are in good health, and none suffer from any form of skin disease.

Her present illness began as a small blister on the front of the chest in June, but for about six weeks previously she had been slightly out of sorts, without appetite or relish for food. This blister burst and a crust formed, and from that date onward fresh ones appeared in succession, involving a wide area in course of time. The blisters were at first tense and clear, occasioned no pain, but were somewhat itchy.

The greater part of the chest, the back, the upper portion of the arms, the abdomen, pubes, and thighs, was denuded of epidermis, was raw, oozing, and bore ragged crusts. The surface exhaled an offensive and penetrating odour. The condition differed entirely from the more ordinary dry exfoliative dermatitis, into which psoriasis is occasionally prone to pass, and which may arise from a pre-existing eczema, from lichen planus, or may even spontaneously manifest itself. The skin in fact presented the aspect of a superficial scald, and corresponded exactly to the terse description of pemphigus foliaceus given forty years ago in Hebra's classical work.

To commence with, she had a starch and boric acid bath, and 5 minims of liq. arsenicalis were administered thrice a day. But on 2nd September she developed parenchymatous tonsillitis, with a pulse of 120, and rise of temperature. The temperature indeed had been slightly above normal on the two days after her admission, but it rose steadily on the 1st September, and on the 3rd, 4th, and 5th remained about 103°·5, falling gradually to normal on the 10th. On the evening of the 10th and morning of the 11th the temperature was 96°·5, then it rose to normal, and she died without warning, quite suddenly, conscious to the last. For the tonsillitis, guaiacum and salicylate of soda, in doses of 10 grs. each, were substituted for the arsenic. This relieved, and the tonsillitis rapidly subsided; but the bowels, which had previously acted only once a day, or were slightly constipated, were now moved loosely four times, probably the effect of the guaiacum. A peculiar measly rash came out on the 3rd September; on the arms it quite resembled measles, but on the knuckles was in larger blotches, more like erythema multiforme. It faded on pressure, and was present everywhere the epidermis was intact. The face was flushed, and the skin round the eyes was raw and tender. On the 8th September she was delirious, and did not sleep even though she had 20 grs. of sulphonal in hot gruel. She slept, however, on the 9th, under the action of bromidia. Unfortunately permission to have an autopsy was refused.

The disease ran an unusually rapid course, for though almost invariably fatal, an individual suffering from it may survive even for many years. The continuous warm bath advocated by Hebra does little more than render the distressful condition more endurable. Sepsis, due to absorption from the raw and fœtid surface, accounts to some extent for the febrile movement; and the lowered vitality consequent thereon would explain why the tonsillitis, not in itself a dangerous ailment, was the immediate cause of death.

In pemphigus foliaceus the abnormality manifests itself in the continual production and exfoliation of unripe and unhealthy epidermis, but in an equally rare modification, known as pemphigus vegetans, it is the exposed floor of the bleb on which exuberant granulations develop. Though it is now more than twenty years since it was accurately described and isolated by Neumann, and since then a considerable number of cases have been published, its extreme infrequency seems proved by the fact that since the instance published by myself and Professor Welsh[1] only one other example has been reported in the United Kingdom.[2] It appears, therefore, worth while to place the short account of a well-marked case on record.

Case 4. *Pemphigus vegetans.*—Dr. George S. Carmichael asked me, on 3rd October 1905, to see a curious case with him. The patient, Miss S., æt. 55, had been in apparently good health till a year before, when in coming downstairs, wearing a pair of very high-heeled boots, a projecting nail caught in the carpet, and, to save herself from falling, she turned suddenly round, and in catching hold of the baluster, twisted herself. It is not known if she experienced pain, but ever after she was very easily tired. Previously a good walker, she now felt much exhausted after a short stroll. It was not, however, till June 1905

[1] *Brit. Journ. Dermat.*, London, 1902, August.
[2] *Ibid.*, Sir Dyce Duckworth, 1904, July.

that erosions formed in the nostrils, accompanied by slight bleeding. Next, the conjunctivæ became inflamed with troublesome lacrymation. In July erosions appeared in the mouth, affected the lips and later the skin round the mouth and the eyes. In September vesicles showed themselves on the neck, arms, and in the groins and about the vulva.

When seen she exhibited a sallow complexion, with dark and rather scanty hair. The skin round the eyes for more than an inch was eroded, rough, dry, and in parts crusted. The eyelids were red and swollen, the conjunctivæ injected. The upper lip was covered with dark, hard hæmorrhagic scabs. The surface of the lower conveyed more the impression of a mucous patch or tubercle; it was raw, granular, and denuded of epithelium. The interior of the mouth was tender, the tongue raw, red in places, superficially eroded, and bore masses of whitish soddened epithelium. The chin and the space below the lip showed a reddened surface, on which were gyrate erosions including paler areas of skin nearly normal in aspect. The grooves or erosions had a pretty uniform breadth of $\frac{1}{8}$ in. On the back were smaller erosions and some large thick scabs. The erosions on the shoulders assumed a round or oval shape, with a red areola, and within this there was a deeper, circular, worm-eaten band of epidermis. On the arms were scattered blebs and erythematous areas. The blebs were flaccid, their roof delicate and readily removed. So far there was nothing noticeable in the axillæ. But the same condition prevailed at the umbilicus, in the groins, and round and inside the vulva, with here and there traces of vegetations. There were large and painful blisters on the malleoli. The feet showed some œdema. The urine did not contain albumin. The pulse was 120, and felt hard and incompressible. The bowels tend to constipation. She sleeps badly, partly from pain in the skin, but both in the daytime when awake and at night she has sudden and unexpected startings of the limbs. The knee reflex was normal or possibly exaggerated. She was steadily emaciating. The temperature was said to be fairly normal. She has had mercury internally and various lotions without any improvement.

She was ordered arsenic and cinchona, in increasing doses. And for the skin oleo-calcareous and other soothing lotions. A nutritious and unstimulating diet. At one time Dr. Carmichael reported to me that there was a slight but transient improvement. But the vegetations grew more pronounced, the jerkings more severe, and an extremely offensive odour exhaled from the body. Incontinence of urine and fæces set in, and death ensued on the 8th November.

It was most unfortunate that permission to have a post-mortem examination was refused, as such would have afforded an opportunity to test the findings in my previous case. The startings of the limbs pointed to possible spinal lesions, and a further step in the pathology of such cases would have been gained, had it been found that the nerve cell degenerations in the cord, so fully described by Dr. Ford Robertson in the instance referred to, were also present. There was nothing discoverable in the patient's history which led up to or explained the phenomena, except the accidental twist. She had a comfortable situation as a housekeeper, and led an easy life free from any particular worry or anxiety.

Vesicles or bullæ form an essential part of the diseases or varieties of diseases already mentioned, but these occasionally occur in the course of disorders which seem alien to such manifestations. Thus lichen planus has been regarded as a typically dry and papular dermatosis, yet the eruption of vesicles in association with it has now been noted in many instances, ever since Baker first drew attention to it so far back as 1881. The whole subject has been exhaustively considered and criticised in an article by Trautmann,[1] to whose conclusions reference will be made shortly. But first the sole example which has come under my observation may fitly be related.

CASE 5. *Lichen planus with bullous lesions.*—Mrs. S., æt. 35, Edinburgh. Sent to Royal Infirmary by Dr. Thyne, on 27th December 1902. Somewhat pale woman, married nine years but has no children, nor has she had any miscarriages. The disease, which has lasted a month, began on the flexor aspect of both wrists. Here there are now thickened, dry, slightly scaly patches of characteristic lichen, not very well defined at their margins, and some 2 in. square. On the outer side of the upper arms, and spreading down to the forearms, are roughish, ill-margined areas, much like a dry erythematous eczema, without evidence of papules. Round the waist in front are rough patches like those on the upper arms. On the front of the thighs, extending well up the inner aspect towards the perineum, and on the nates, are thickened and elevated patches of lichen, and between these are scattered many minute, angular, pinkish, burnished papules of lichen. The patches on the inside of the thighs and those on the nates are of a delicate pink hue. In addition to the intrinsic eruption of lichen, there are to be seen here and there on the front of the thighs, some clear vesicles and small bullæ, which are devoid of areolæ. There are also adherent crusts, remains of previous blebs, and one or two denuded spots, where the blebs have ruptured, but as yet no crusts have formed. The glands in the neck and groin are not swollen. She was directed to apply calamine lotion containing some boric acid, and to take a mixture of iron, arsenic, and strychnia thrice daily. Though she was asked to report herself in course of a week or two, she was not again seen.

The question to be solved in connection with this case is, whether the bullæ constituted an essential part of the eruption, or were to be regarded as merely an accidental concomitant? To decide this one must first eliminate the possibility of the action of drugs. Unfortunately it was not ascertained here what had been the treatment prior to her presenting herself at the Royal Infirmary, but there are instances on record where bullæ appeared in association with lichen planus, where no arsenic at least had been given. Arsenic has been lauded as the remedy *par excellence* in so many treatises, that most cases of lichen planus of any duration are pretty sure sooner or later to have it. Arsenic has been credited with the power of evoking the eruption of vesicles, herpes zoster being cited in support of this, since it, in too many cases to be a mere coincidence, has followed a course of that drug. Other medicaments, however, are known to induce the formation of blebs in certain cases or individuals, as mercury and iodide of potassium internally and salicylic acid externally. The bullæ have been seen to develop out of the papules of lichen, and histology demonstrates that both in the epidermis itself and at its junction with the corium, spaces or lacunæ are found, which some have looked on as vesication in embryo, or at least as the basis on which or out of which vesicles may arise from irritation, be that scratching to relieve the itching of lichen, or from the use of stimulant applications. Besides Trautmann already referred to, who has collated and annotated on all ascertainable examples, Whitfield[1] and C. W. Allen[2] have made valuable contributions to this subject. It is still, notwithstanding, *sub judice* whether this rare manifestation of lichen planus is to be considered as intrinsic or casual. It does not seem to influence prognosis unfavourably.

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[1] *Dermat. Ztsch.*, Berlin, 1906, May.

SOME LESSONS FROM THE STUDY OF ARTERIAL PRESSURE.[3]

By G. A. Gibson, M.D., F.R.C.P.Ed., *Physician to the Royal Infirmary, Edinburgh.*

My contribution to the discussion on blood pressure at the Annual Meeting of the British Medical Association at Toronto was, by request, limited to the consideration of clinical methods, and the results obtained by such methods were dealt with by subsequent speakers in the debate. But it seemed to me quite necessary to point out the factors upon which the pressure of the blood depends, and on this occasion, in appearing before you in response to the kind invitation with which you have honoured me, you will permit me briefly to mention by way of preface the considerations which were then advanced.

The blood pressure is primarily due to the cardiac energy, as shown by amount of outflow and velocity of expulsion. All the cardiac functions—rhythmicity, excitability, contractility, conductivity, and tonicity—are certainly engaged. The intrinsic energy of the heart is subject to extrinsic conditions, *e.g.*, the amount of blood reaching it from the great veins, and the resistance which it has to overcome. Increased rate, with free access of blood, as a rule raises the pressure, and *vice versa*; yet in such a condition as heart-block with bradycardia the arterial pressure may be nearly 300 mm. Hg. Any lessening of the afferent blood lowers the pressure; every increase in resistance up to a certain level raises it. If the resistance, however, is too high, the outflow is reduced and the pressure falls. The cardiac energy may be modified by the influence of the augmenting and inhibiting nerves. By means of the nervous mechanism, moreover, the heart is automatically relieved from the effects of overwork. As regards the action of the heart, then, we may conclude that any increase in the outflow from the ventricles raises the blood pressure, when the other factors are constant, and, conversely, a diminution produces a fall. This may perhaps be due to increased velocity, caused by the action of the augmentor nerves without any acceleration of rate.

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[1] *Brit. Journ. Dermat.*, London, 1902, May.

[2] *Journ. Cutan. and Genito-Urin. Dis.*, N.Y., 1902, June.

[3] The Address at the Annual Meeting of the Sunderland Division of the North of England Branch of the British Medical Association.

The peripheral resistance has great importance in maintaining the arterial pressure, and this is found to depend on several causes. The tone of the blood vessels is the most powerful factor in this connection. The general tone is due to a balance between the influence of the vaso-constrictor and vaso-dilator nerves, but, as the latter are not continuously in action, they may be disregarded. Time forbids my dwelling upon the subject, but you will allow me simply to recall the well-known fact that if the tone of the blood vessels is seriously lowered, there is more or less complete venous stasis, and greater or less failure of the circulation from lack of blood reaching the heart. The tone of the blood vessels presents general and local variation. The general pressure responds to the general tone throughout the entire circulation, but the local pressure undergoes great changes in accordance with special requirements. The most remarkable facts bearing out this statement are derived from the abdominal vessels under the influence of the splanchnic nerves. An increase of function in any particular area produces an increased blood supply through the action of the vaso-dilator nerves, leading to dilatation of the smaller arteries. Conversely, cessation of function in any part is at once followed by the resumption of the normal tone exerted by the vaso-constrictor nerves. Further, it has been proved that the general as well as the local blood pressure is subject to reflex influences arising even in distant parts. To sum up this part of the subject, we may say that, other factors being constant, increased resistance is associated with higher, and lessened resistance with lower, pressure.

Vascular elasticity is of great importance. By means of it the energy of the heart is transferred to the vessel walls in the form of potential, continuously becoming kinetic, energy; in this way the onward movement of the blood is subject to a much more continuous influence than if it were solely dependent upon the intermittent energy of the heart. When the structure of the blood vessels is intact, they possess extremely wide limits of elasticity, meaning that their walls can return to normal after great distension. When this wide limit of elasticity is lessened by morbid changes, there is an increased resistance to the blood flow, and at the same time a tendency to distension of the vessels.

The amount of blood in circulation must be of some importance in regard to arterial pressure, but it has less influence than the factors which have just been considered. The comparatively slight effect of changes in the contents of the vessels is obviously due to the fact that variations in the amount of blood speedily bring about compensatory alterations in the tone of the blood vessels, so that they adapt themselves to the quantity they contain, and restore the pressure to the normal for the conditions which are present. Our knowledge of this subject is chiefly the result of experimental physiology, at least as regards additions to the amount of blood in circulation. Physiological researches on the effects of reduction of the amount are borne out by observations upon cases of severe hæmorrhage in practice. The data obtained from both sources of information lead us to the conclusion that changes in the volume of the blood only produce transient effects on arterial pressure.

The viscosity of the blood is another factor which undoubtedly has some importance; the amount of weight to be attached to this influence is at present largely a matter of speculation. As there is always a layer of blood, more or less stationary, in contact with the walls of the blood vessels, the viscosity is probably not very important.

The Toronto discussion was remarkable, amongst other aspects, for the sharp divergence of opinion between some of us as regards the value of digital palpation of the pulse: Sir William Broadbent stoutly asserted that the pressure of the pulse could be more satisfactorily ascertained by means of the educated finger than by the use of any of our modern instruments, while it was my solemn duty, on the other hand, to confess quite frankly that thirty years' experience had taught me how extremely fallacious this method is. It is undoubtedly incumbent upon each and all of us to train our fingers to the utmost of our power, yet, as was stated in Toronto, it is about as easy to gauge the arterial pressure by means of the fingers as to estimate the temperature by applying the hand to the skin. We can, it is true, learn a great deal, not only about the arterial walls, but about the general state of the circulation, by means of the educated finger, but no one, however skilful and experienced, can gauge the pressure. On the present occasion it does not fall within the scope of my remarks to discuss the various instruments which are of use in the estimation of arterial pressure; but you will allow me to say that, with the exception of the sphygmomanometers which employ the method of circular compression — obliterating the pulse in one of the larger arteries by means of a broad cuff in communication with a mercurial manometer — all other instruments are only of historic interest. Amongst the instruments which are of real utility may be mentioned those of Riva Rocci, Martin, Cook, Stanton, Janeway, Erlanger, and myself. Amongst these there are only two which give graphic records—that of Erlanger and my own. Erlanger's instrument gives beautiful tracings of the oscillations of the column of air between the cuff and the column of mercury, but it in no wise gives any record of the height of the column of mercury by which the pressure may be estimated, and it is necessary to watch the manometer and note the oscillations of the mercury by means of the eye. My own instrument traces the movements of the column of mercury itself, and, by means of a transmission sphygmograph applied to the artery below the point of compression, it gives an absolute record of the height of the column at which the return of the pulse occurs—in other words, it graphically records the systolic pressure. Erlanger's instrument gives an approximation to the diastolic pressure; but here again it is necessary to read the height of the column of mercury and make a note of it, while, in my own instrument, the diastolic pressure, like the systolic, is graphically recorded.

Before we proceed to the consideration of the uses of the sphygmomanometer in disease, it is necessary to have clear conceptions of the limits of arterial pressure in healthy people. From my own observations, as well as from the results obtained by many reliable observers, the normal systolic pressure in healthy young adults may be stated as varying between the limits of 100 and 140 mm. of mercury, the most usual figures being from 120 to 130. The diastolic pressure varies between 70 and 100, the commonest limits being from 80 to 90. Certain variations in pressure must be regarded as normal, and, in considering that of any individual, these considerations have to be remembered.

There are, in the first place, daily fluctuations, resulting undoubtedly from many different influences, some of which are at present obscure. It may be stated that in general the pressure attains its maximum in the forenoon, after which it falls, commonly, however, manifesting another rise in the afternoon. These facts lead us to the conclusion that our readings must be taken at the same hour as far as possible. The influence of food is rather variable. A rise of pressure is sometimes found after a meal, but a fall takes place almost as commonly. The fall can easily be explained by the diversion of blood into the abdominal vessels; but as this is often compensated by reflex stimulation of the vasomotor system, the entrance of food may undoubtedly elevate the pressure. All readings of the pressure ought, therefore, to be taken in any individual with a definite relation to the administration of food. Posture has considerable effect on the pressure. A change from lying to sitting does not produce much effect, but a great influence is exerted by the change from either of these positions to that of standing. It is the diastolic pressure which is mostly modified by this change of posture, and the pulse pressure limits are, therefore, lessened by the upright position. It is obvious that, when observing the arterial pressure of any individual, it should always be done in the same position. The effect of occupation upon the pressure is considerable, both as regards physical and mental exertion. It is therefore necessary to note with what the person under observation has been employed previous to making the observations. Those who lead lives requiring considerable exertion have, speaking generally, a higher pressure than those whose energy is not subject to such severe demands. It is accordingly needful to take into consideration in every case the occupation of the individual. We do not yet know to the full what influence is exerted by external temperature, but we know sufficient to be certain that when the individual under observation is subject to any departure from the normal external temperature, he is apt to show a rise of pressure. As yet we know very little about the effect of such articles as tea and coffee, but we know that alcohol, after a slight initial rise caused by acceleration of the heart, brings about a fall of arterial pressure. Tobacco, on the other hand, effects an increase of pressure by its influence on the vaso-constrictor apparatus, and, as has been more particularly observed in France, it leads to hyperpiesis. Both alcohol and tobacco lead in the long run to arterial sclerosis.

In our attempts to estimate the absolute value of arterial pressure, our investigations are surrounded by many limitations. These to a large extent consist in the difficulties attendant on the determination of the different factors maintaining the pressure. "The relative amounts of energy and of resistance are still a sealed book. An absolutely low general blood pressure may be one which is relatively too high for the energy of the heart; while, on the other hand, a pressure which appears to be abnormally high may be one which is quite low in relation to the energy of the heart. The fact that arterial spasm, general or local, has an important influence in modifying the blood pressure, has always to be borne in mind; as a disturbing factor it may produce rapid changes in its level." These remarks made by me in the Toronto discussion sum up our chief difficulties in connection with the study of blood pressure.

To show clearly some of the practical results which flow from the study of arterial pressure, it will be most helpful to you if my remarks are confined to my own observations, from which you will allow me to select some examples both of acute and of chronic disease. Undoubtedly the most constant results in any of the acute infectious diseases are to be found in typhoid fever. In this disease the arterial pressure is almost invariably low, the fall in pressure beginning towards the end of the first, or early in the second, week, and progressing steadily until convalescence is established. Unfortunately for my present purpose, it is only occasionally nowadays that typhoid fever comes under my own immediate observation, and it is therefore impossible for me to lay before you anything of value from personal experience. But the case is very different as regards pneumonia, which is rarely absent from my wards, and in which, therefore, abundant opportunities of observation have been afforded me. It is undoubtedly true that pneumonia has not such a uniform effect on arterial pressure as is seen in typhoid fever, and the results of many different observers show extreme variations. It may be stated as a general rule that the pressure tends to be a little below normal, with considerable variations throughout the course of the disease. It has been asserted that there is a sudden fall at the period of the crisis; this, however, has certainly been far from common in my experience. A pressure appreci-

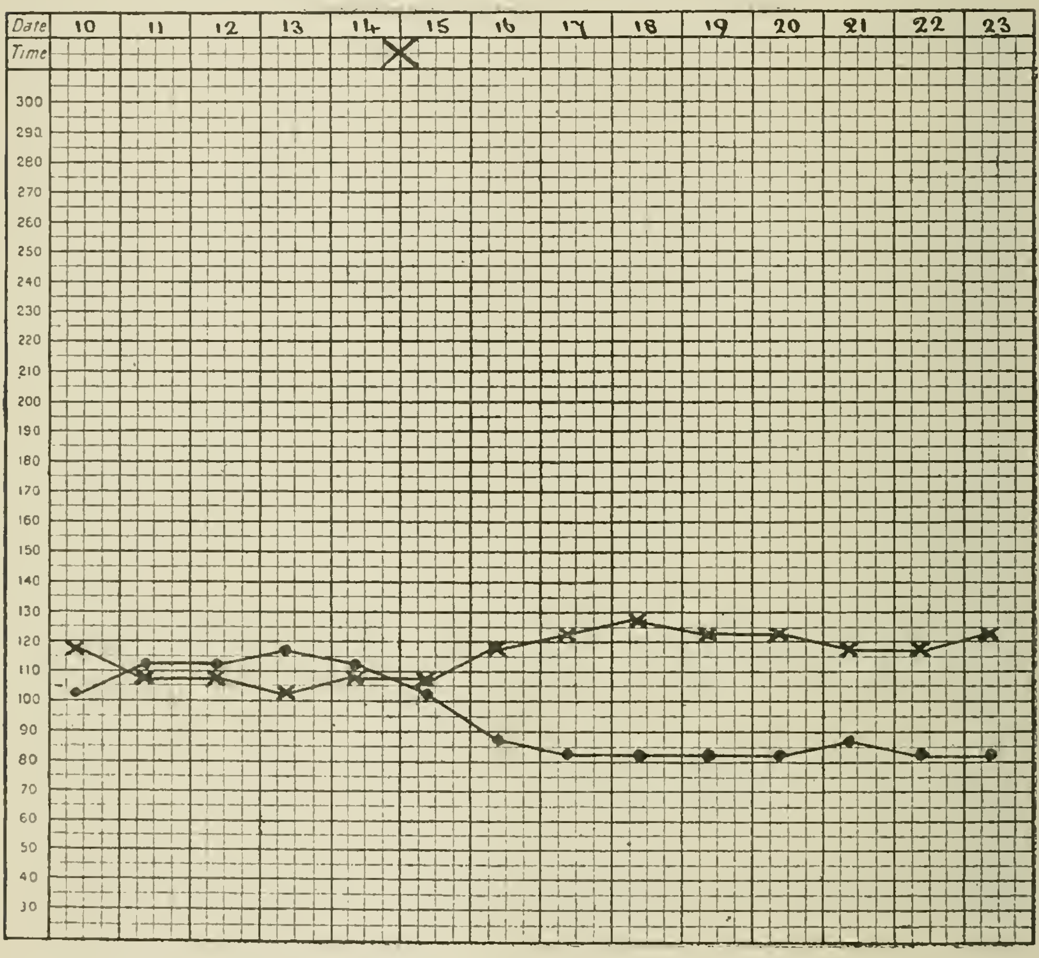

Fig. 1.—Chart of pulse rate and arterial pressure from a case of acute pneumonia. The crisis occurred between the evening of the 14th and morning of the 15th October, and was not accompanied by any fall of the pressure, although the rate of the pulse gradually sank. Daily record, about 11 a.m. The crosses give the pressure and the dots the rate in all the charts.

ably below the normal in pneumonia is invariably of evil omen, and any considerable fall bodes disaster. When the arterial pressure, expressed in millimetres of mercury, does not fall below the pulse rate, expressed in beats per minute, the fact may be taken as of excellent augury, while the converse is equally true. From the work of the last few years in my own wards no fact is more certain than this. It is illustrated in the charts, Fig. 1 and Fig. 2.

In the endocarditis of acute rheumatism the pressure is very often below the normal, but, as might readily be expected, there

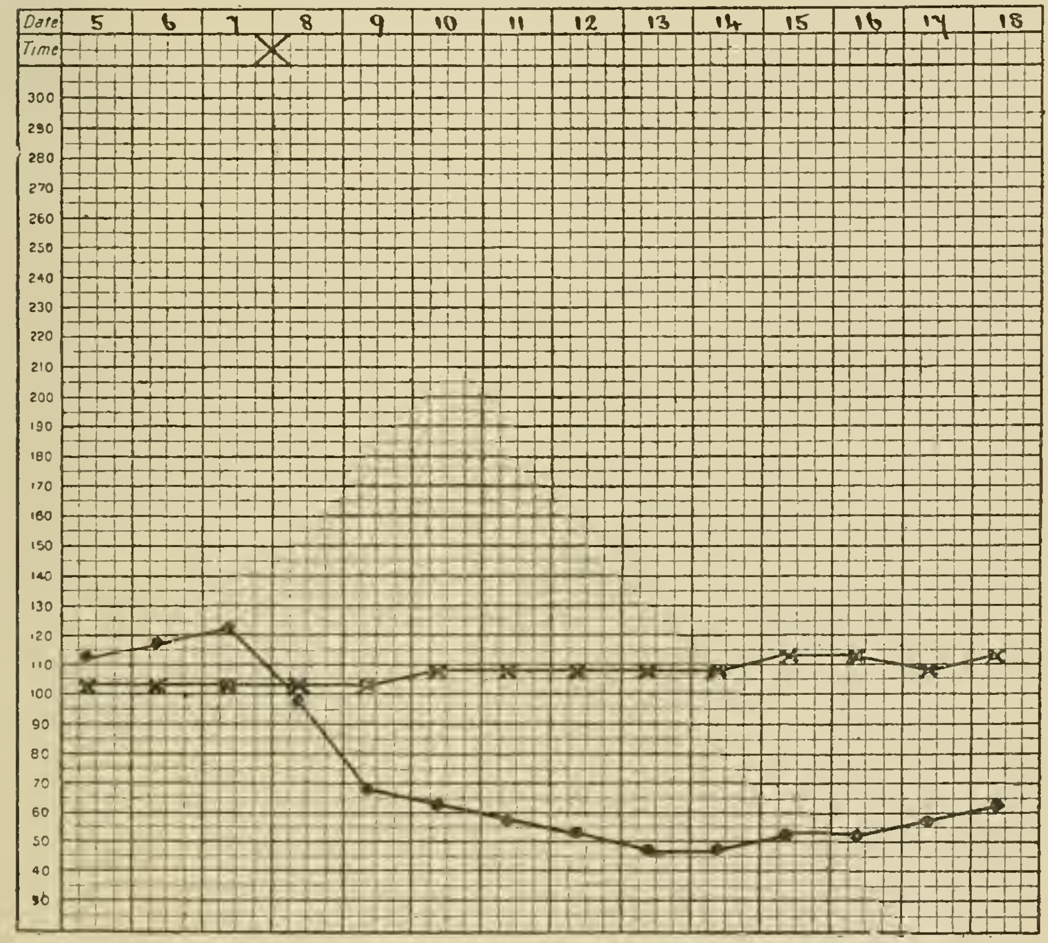

FIG. 2.—Chart of pulse rate and arterial pressure from a case of acute pneumonia. The crisis took place between the 7th and 8th October, with no change in pressure, but a great diminution of rate. Daily record, about 11 a.m.

are very considerable variations in it. There are not merely in this disease great fluctuations of temperature, which undoubtedly cause the variability of pressure in pneumonia, but the effects of the toxins upon the heart muscle, and the disturbances produced by the alterations in the cusps, have to be taken also into account. In this affection the more nearly the arterial pressure approximates to the normal the better is the outlook for the patient. A good example of the range of pressure in endocarditis is given in Fig. 3. The arterial pressure in acute disease furnishes one of the most valuable guides in regard to prognosis, and the brief references to my observations which have been laid before you will, it is to be hoped, lead you to give some consideration to the subject.

When we turn to chronic affections we are confronted by a totally different series of conditions. Instead of rapid effects and swift changes, we meet with alterations of gradual, even of insidious origin; of slow, perhaps of imperceptible development; of continuous, possibly of relentless persistence. Two such conditions may be mentioned, both of them taken from the heart. Aortic disease, implying both obstruction and regurgitation at the aortic orifice, presents one of the most striking examples of such affections; it is of great interest to find that in this disease the arterial pressure is of real value in prognosis and therapeutics. In some cases of this disease the systolic pressure is extremely

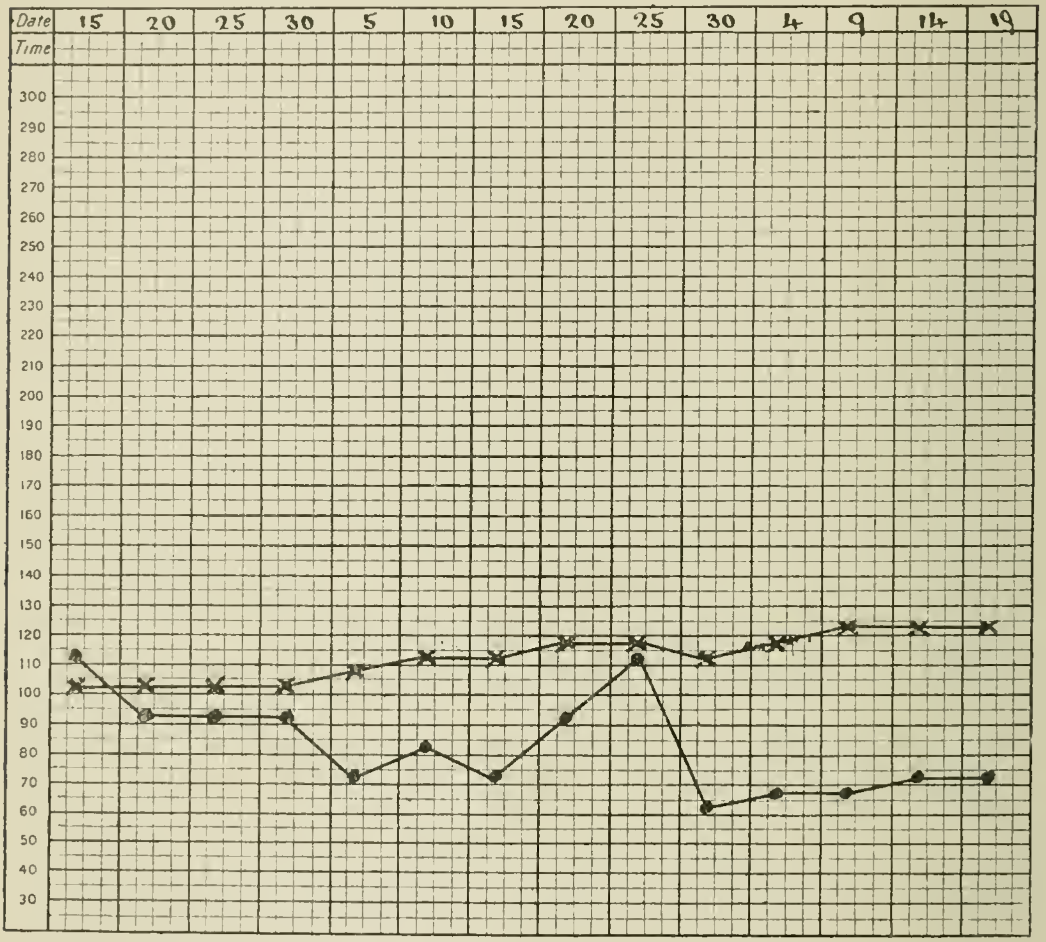

Fig. 3.—Chart of pulse rate and arterial pressure from a case of acute rheumatism with pericarditis and endocarditis. The steadiness of the curve showing the pressure readings is in strong contrast to that giving the pulse rate. The record gives the figures every fifth day at 11 a.m. from 15th June to 19th August.

high, and the diastolic pressure remarkably low. Readings taken from cases under my own observation have frequently furnished a systolic pressure of 180 or 190, with a diastolic pressure of 70 or 80. On the other hand, in this disease it is quite common to find that the extremes are not so widely separated, and that the variation between maximum and minimum does not exceed 50 or 60. It must be obvious in these latter cases that the outlook for the patient is very much better than when the circulatory apparatus is subjected to enormous extremes of pressure. When the limits are very wide it is much more necessary to insist upon the avoidance of over-exertion than when the extremes are not widely separated. Taken in conjunction with the amount of cardiac hypertrophy and the characters of the arterial pulse, the blood pressure is, therefore, of extreme importance.

Another chronic condition which has lately attracted a great deal of my attention is that of heart-block, associated with bradycardia. Most of the cases which have been recently studied by me have manifested extreme infrequency of the pulse, as the result of a failure of conduction at the auriculo-ventricular junction, and in most of the cases it has been possible to prove that the auricles pulsated three or four times for each contraction of the ventricles. In some of these cases the systolic pressure has reached as high a level as 270, while the diastolic has been only 80. Undoubtedly, in some of these cases, conditions analogous to those of aortic disease have been present, inasmuch as the heart was hypertrophied and a large quantity of blood was ejected during each systole. Then, as the period of repose succeeding the cardiac diastole was enormously prolonged, the pressure was allowed to fall to a low level before the succeeding systole occurred. In this way, although from a totally different cause, extremely wide limits of pressure are produced.

Another series of conditions affecting blood pressure is to be found in alterations of the arterial walls. In the discussion of these conditions, however, we are brought face to face with such a complex group of causes, that it is often extremely difficult to come to any definite conclusion as to which is the principal factor in bringing about the morbid results. It is an extremely common experience to find arteries which are very thick in association with low pressure, while the converse is equally true that arteries which are in no respect thickened are found to be associated with high pressure. Such conditions are of necessity more common in advancing years, but they have met me frequently in those who are still young. General arterial sclerosis is, without doubt, usually associated with high pressure. In a large proportion of such cases the pressure is high, and the aortic second sound gives the musical ringing character so aptly termed by Potain the *bruit de tabourka.* But, on the other hand, a very obvious arterial degeneration may be associated with moderate or even low pressure, which, at first sight, is a hard saying. It is probable that the observations of Hasenfeld and Hirsch furnish the explanation of many discrepancies. Unless the internal arteries have undergone sclerotic changes as well as the external, the pressure is not elevated. But, in other cases, where the aorta has undergone degeneration and has become dilated, and where the splanchnic vessels have become sclerotic, the pressure is usually much above the normal. A continuous systolic pressure of about 300, with a diastolic pressure of about 230, is quite common.

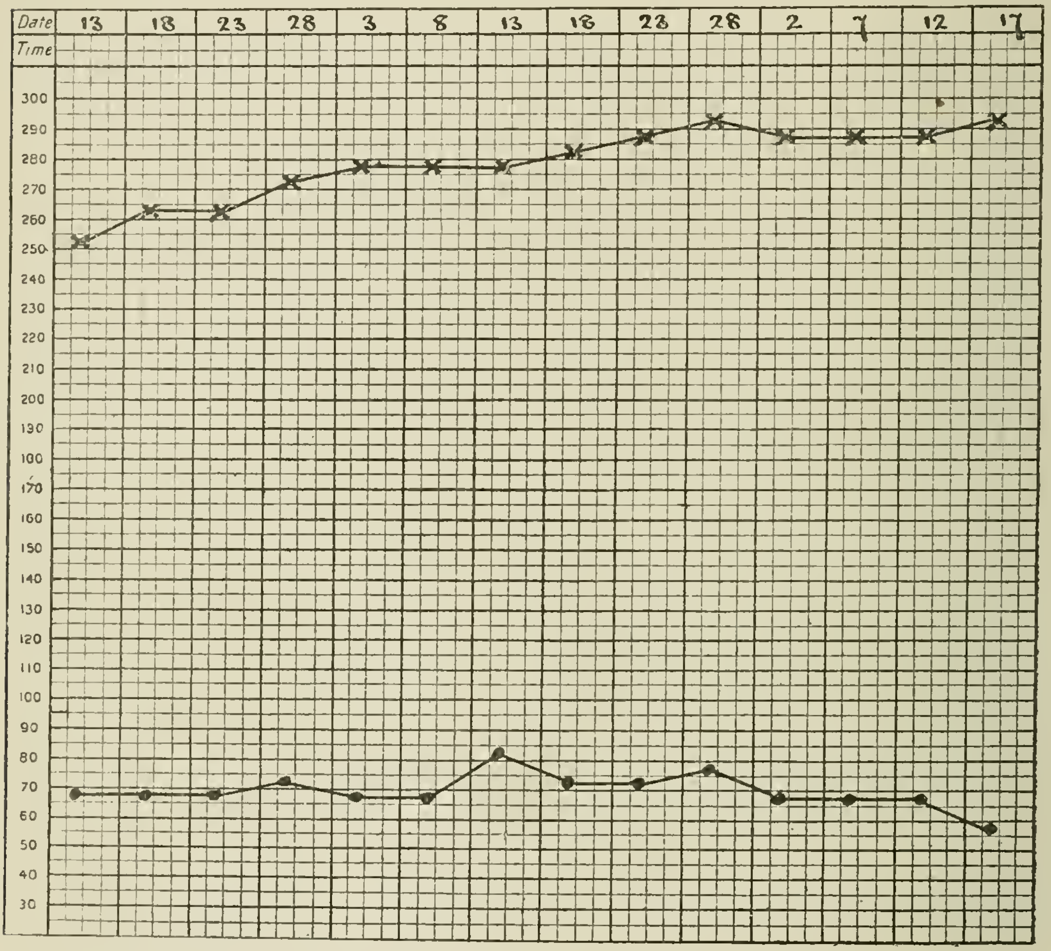

Fig. 4.—Chart of pulse rate and arterial pressure from a case of arterial sclerosis, cardiac hypertrophy, and interstitial nephritis. It shows a continuous high pressure in spite of all measures adopted. The record gives the figures every fifth day at 11 a.m. from 13th September to 17th November.

The last illustration to be brought before you is that afforded by Bright's disease, and the type which will occupy our attention is chronic interstitial nephritis. Let me say, however, before entering upon this particular disease, that a great deal of the teaching which has been in vogue in regard to acute nephritis and certain forms of chronic nephritis has been based on observations far too limited in their scope. The arterial pressure in acute nephritis has, in my own experience, frequently been subnormal, and it is, therefore, difficult to accept without reservation the conclusions which were urged a good many years ago by Mahomed. Again, in many cases of parenchymatous nephritis under my own observation, the pressure has frequently not been above the normal, which certainly leads to the conclusion that many factors must be at work in those cases which manifest an increase of pressure. Interstitial nephritis is so commonly, if not invariably, associated with arterial sclerosis, that the two processes must be regarded as merely different aspects of a general disease, in which, however, there may be infinite varieties on account of the distribution of the principal changes. In this disease the pressure reaches the highest point attained in any chronic affection, and not infrequently this high pressure defies every effort at reduction. As illustrative of such a case Fig. 4 may be referred to. It gives the results of continuous observations on an elderly man in my

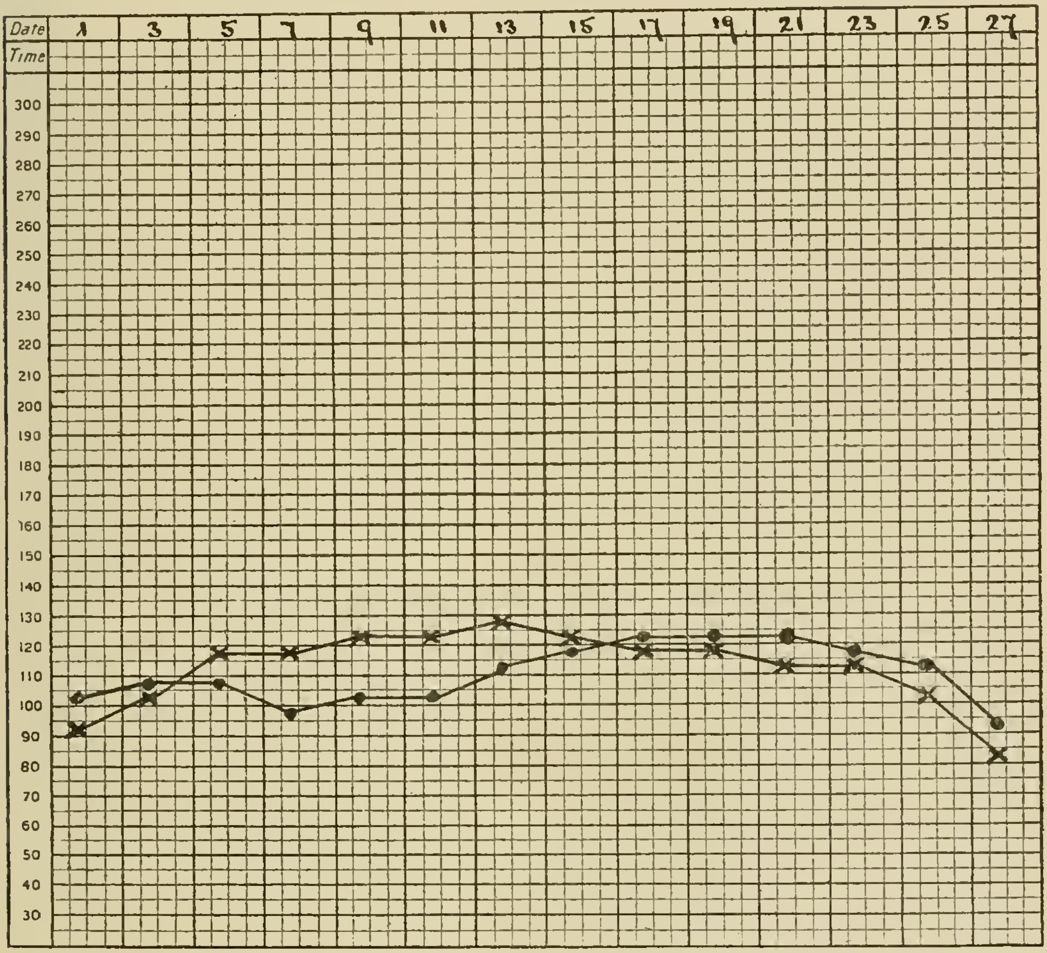

FIG. 5.—Chart of pulse rate and arterial pressure from a case of Addison's Disease. The employment of adrenalin caused a temporary rise of pressure, and later an increase of rate, but after a fortnight it ceased to produce these effects, and the patient gradually sank and died. The pressure is recorded every second day, taken about 11 a.m., from 1st to 27th October.

own wards, with general arterial sclerosis, cardiac hypertrophy, albuminuria, and threatened attacks both cerebral and cardiac. In spite of every means to lower the arterial pressure, including venesection and all the nitrites, as well as continuous administration of the iodides, the pressure remained persistently high, because none of our therapeutic measures were able to influence the arterial walls.

One last subject may receive brief attention in passing. In Addison's disease the arterial pressure is generally, but not invariably, low. It is probable that the varying results obtained in this affection are due to the respective implication of the cortical and medullary portion of the suprarenal capsules, the latter of which alone furnishes the pressor substance. Cases under my care have almost invariably given readings varying between 80 and 100 of systolic pressure. Lower readings have been observed by Stursberg and other workers. An interesting chart from a recent case under my charge in the Royal Infirmary is shown in Fig. 5. Under the influence of adrenalin the blood pressure steadily rose and then began to sink, and the patient, towards the end of his life, had a blood pressure of about 80.

Enough has been said to show how much of scientific interest and of practical utility revolves around the subject of arterial pressure. There are many difficult problems connected with it, upon which, on this occasion, it is no part of my duty to dwell. With a group of factors so numerous and so varied as those which control the arterial pressure, it can be no matter for surprise that there is considerable diversity of opinion in respect of some of its aspects. As regards the clinical investigation and therapeutic indications furnished by its study, there are still many matters requiring elucidation, and it seems to me that our chief hope for the solution of the difficulties surrounding the subject must be in the collection of a large number of facts by competent observers. Even with a great group of such observations there may still be certain discrepant opinions on some of the more knotty points, since we fortunately do not look at every subject from the same point of view,

"And minds are many, though truth be one."

THE "ENERGY-QUOTIENT" IN INFANT FEEDING.

By J. S. Fowler, M.D., F.R.C.P.Ed., *Physician, Royal Hospital for Sick Children, Edinburgh.*

The object of this paper is to draw attention to an aspect of the problem of infant feeding which has received little or no consideration in this country or in America, though it has been the subject of a good deal of research by German workers. I refer to the question of the number of calories which is required for the normal growth of the infant. In selecting a diet for an adult a caloric standard is employed, and by its use we are enabled to compare the potential energy of different diets. The reason why the caloric value of the infant's diet has been practically left out of account is that, owing to its uniform composition (cow's milk in nearly all cases), the appetite, weight curve, and known capacity of the stomach give sufficient indications as to the amount of food we must supply. If, therefore, we surmount the difficulty of modifying the milk so as to adapt it to the digestive powers, it is easy to regulate quantities by attention to weight, age, and appetite.

Thus it cannot be claimed that a knowledge of the energy value of foods or the calories required is indispensable, but at the same time I think that under certain circumstances it will prove of assistance, namely, when from one reason or another we are driven to feed an infant otherwise than on cow's milk. My own interest in the question was aroused in this way. In bad cases of chronic gastro-intestinal disorder, accompanied by malnutrition, it will often be found that the power of digesting cow's milk is very feeble, and in such cases we are frequently compelled to make use of some temporary substitute, such as condensed milk, butter-milk, albumin water, raw meat juice, malted cereals, whey, etc., until the diarrhœa and vomiting cease, and the stools become normal. And one finds, further, that even when the digestion has improved, very great care is required in returning to a diet of milk. In cases such as these, especially after the stools have begun to regain their normal appearance, the weight may remain almost stationary, or rise very slowly, and I have frequently been at a loss to say whether this was due to faulty assimilation or to insufficient food. We know by experience how much milk a baby requires, but it is not so easy to determine off-hand what amount of, say, a mixture of whey and a malted cereal is needed for its proper nutrition. It is then that a knowledge of the caloric requirements of the child, and the caloric energy of foods, seems likely to be of assistance, by enabling us without experiment to settle one point,—how much of any food must be given in order to furnish the necessary energy, irrespective of the proportions of proteid, fat, and carbohydrate it contains.

I need hardly say that a food may supply many more calories than is required, and yet be totally unsuitable in other respects: all that we expect to learn from the "energy-quotient" is whether or not a baby is getting *enough* food, and thus to be able to dispense with guidance which in normal infants we gain in other ways.

Calories required by a normal infant.—It is usual to express this in terms of the "energy-quotient," by which is meant the total twenty-four hours' intake of calories divided by the body weight in kilograms,—in other words, so many calories per kilo. This has been somewhat variously estimated by a number of observers, but Heubner's figures (although probably somewhat high) are the most generally accepted. According to him, the normal energy-quotient of a breast-fed child is 100; of an artificially-fed child, 120. The reason why more calories are needed by the latter than the former is that the digestion of cow's milk requires more energy than the digestion of human milk, and the calories representing this leave the body as heat. Small infants, on account of their relatively greater heat loss, require a higher energy-quotient than those which are older and larger. Converting the figures into the English system, we get forty-five and fifty-two as the number of calories per lb. required for the normal growth of breast- and artificially-fed children respectively, according to Heubner's computation.

It seemed that it might be possible to test the practical usefulness of the energy-quotient in a rough-and-ready way. I therefore went over a number of records of cases of simple malnutrition from improper feeding treated as in- and out-patients at the Sick Children's Hospital, and also of a smaller number of healthy infants of whose diet and weight I had notes. It was necessary to reject most of these, either because they were complicated by digestive disorders which had required frequent changes in the feeding, and interupted the gain in weight, or because the notes did not give sufficient details as to quantities taken in the twenty-four hours. It was possible, however, to collect a few in which the data can reasonably be relied upon as accurate. In these cases the amount of food was controlled solely by the results of regular weighing, the digestive powers, the age, and the appetite; no consideration was given to the energy-quotient. The object of analysing the figures was to determine how far the energy-quotient of diets selected empirically conformed to Heubner's standard.

In most of the following tables I have for the sake of simplicity omitted quantities of food, and given only the Energy-Quotient (EQ), that is the number of calories per twenty-four hours per pound of body weight. As the weight rises, if the quantity of food remains the same, the EQ, of course, falls. In the tables the EQ refers to the amount of food given during the ensuing week, *e.g.* in Case 1, milk yielding an EQ of 40 was taken from the eighth to the ninth week, when the quantity was raised to what yielded an EQ of 53.

GROUP *A*.

CASE 1.—Healthy infant, suffering from malnutrition from inadequate breast milk. Weaned, and given a mixture of equal parts cow's milk and water. With an EQ of only 40 the weight was stationary.

TABLE I.

Age.	Weight.		Average Weekly Gain.	Energy-Quotient.
Weeks.	Lb.	Oz.	Oz.	
8	7	9	...	40
9	7	9	+ 0	53
10	7	15	+ 6	60
12	9	10	+ 13	52
14	11	4	+ 13	52
18	13	14	+ 10½	...

CASE 2.—*Malnutrition and vomiting from improper feeding.*—Given equal parts of milk and water. The quantity ordered at first was low, on account of the vomiting. Satisfactory gain in weight only with EQ of 53–55.

TABLE II.

Age.	Weight.		Average Weekly Gain.	Energy-Quotient.
Weeks.	Lb.	Oz.	Oz.	
4	7	2	...	26
5	7	1	− 1	41
6	7	3	+ 2	55
7	7	8	+ 5	55
8	7	14	+ 6	54
10	8	10	+ 6	54
12	9	8	+ 7	53

CASE 3.—Normal infant. Initial gain on EQ of 46; loss as it fell to 43; subsequent steady gain with EQ 50 to 59.

TABLE III.

Age.	Weight.		Average Weekly Gain.	Energy-Quotient.	Milk in 24 Hours.
Weeks.	Lb.	Oz.	Oz.		Oz.
3	6	8	...	46·5	15
4	7	0	+ 8	43	15
5	6	15	− 1	57	20
6	7	10	+ 11	57·8	22
7	8	2	+ 8	53	22
9	8	12½	+ 5¼	59	26
12	9	14	+ 6⅓	58	28
16	11	13	+ 7¾	57	34
20	13	12	+ 7¾	52	36
22	14	6	+ 5	50	35
24	15	2	+ 6	47·7	36

Case 4.—*Malnutrition from improper feeding.*—Slight diarrhœra. Given equal parts of milk and water. Loss when EQ was only 36, and again delayed growth at seventeenth week, when EQ fell to 50.

Table IV.

Age.	Weight.		Average Weekly Gain.	Energy-Quotient.
Weeks.	Lb.	Oz.	Oz.	
10	8	6	...	36
12	8	2	− 2	62
14	9	6	+ 10	55
16	9	11	+ 2½	51
17	9	12	+ 1	72
18	10	4	+ 8	...

From these cases of feeding infants, in whom there was no obvious digestive disturbance, upon diluted or undiluted cow's milk, it will be seen that the energy value of the food corresponded very closely with Heubner's standard, satisfactory gain in weight going along with an EQ of about 50-54, there being only one instance of growth during a week in which it fell below 50.

I next give some instances of feeding with other milk preparations.

Group *B*.

Case 5. — *Malnutrition; constipation and occasional vomiting.*— Given peptogenic milk, at first with half, then with all the usual quantity of cream. From the thirty-sixth week a milk-and-water mixture, yielding an EQ of about 48, was substituted.

Table V.

Age.	Weight.		Average Weekly Gain.	Energy-Quotient.
Weeks.	Lb.	Oz.	Oz.	
22	8	1	...	72
23	8	6	+ 5	82
24	8	12	+ 6	80
25	8	12	+ 0[1]	80
26	9	1	+ 5	77
28	9	10	+ 4½	72
31	10	10	+ 5¼	65
39	12	11	+ 2¼	...

[1] Diarrhœa.

CASE 6.—*Malnutrition; constipation, no vomiting.*—Satisfactory gain on peptogenic milk.

TABLE VI.

Age.	Weight.		Average Weekly Gain.	Energy Quotient.
Weeks.	Lb.	Oz.	Oz.	
8	6	0	...	115
9	6	10	+ 10	100
10	7	3	+ 9	127
11	7	8	+ 5	120
12	8	0	+ 8	92
13	8	0	+ 0[1]	115
15	9	2	+ 9	...

[1] Vomiting and diarrhœa.

CASE 7.—*Malnutrition from persistent vomiting, apparently due from difficulty in digesting casein.*—Carefully fed from birth on modified sterilised milk supplied by a milk depôt. It thrived well on peptogenic milk, but this had to be discontinued; a weak milk-and-water mixture having been unsuccessfully tried, condensed milk was given; on this the child gained weight, but became slightly rachitic.

TABLE VII.

Age.	Weight.		Average Weekly Gain.	Food.	Energy-Quotient.
Weeks.	Lb.	Oz.	Oz.		
12	6	8	...	Peptogenic milk	76
13	6	15	+ 7	,, ,,	72
15	7	8	+ 4½	,, ,,	66
16	7	12	+ 4	Dilute milk	40
17	7	12	+ 0	Condensed milk	130
18	8	2	+ 6	,, ,,	120
20	8	13	+ 5½	,, ,,	106
23	9	2	+ 1⅔[1]	,, ,,	100
25	10	0	+ 7	,, ,,	96
27	10	9	+ 4½	,, ,,	90
31	12	2	+ 5¾	,, ,,	80
38	13	8	+ 3⅐	,, ,,	100
40	14	1	+ 4½	,, ,,	90
47	15	10	+ 3½	,, ,,	...

[1] Vomiting.

The noteworthy point about these last three cases is the high energy-quotient provided by the food. It frequently rises to nearly double that received by the previous group.

CASES 8 and 9. — *Infants with bad chronic and subacute gastro-intestinal catarrh, and great intolerance of casein, who thrived fairly well on pasteurised butter-milk.*—In each case it was at first given unmodified; subsequently flour and sugar were added. The caloric values on which gain took place are on the whole slightly higher than in Group *A*, but much lower than in Cases 5–7.

Table VIII.

CASE 8.

Age.	Weight.		Average Weekly Gain.	Energy-Quotient.	Food.
Weeks.	Lb.	Oz.	Oz.		
19	8	8	...	54	Butter-milk.
20	9	10	+ 2	70	,,
21	10	2	+ 8	64	,, (with flour and sugar).
22	10	6	+ 4	62	Butter-milk.
23	10	8	+ 2	61	,,
24	10	10	+ 2	61	,,
			CASE 9.		
35	9	10	...	33	Butter-milk, 40 oz.
36	9	2	− 8	77	,, ,, (with flour and sugar).
37	9	10½	+ 8½	73	Butter-milk, 40 oz.
38	10	1	+ 6½	...	Milk and water.
		Diarrhœa			
39	9	12	− 5	...	... ...

Case 10.—*Malnutrition, diarrhœa, and vomiting from improper feeding.*—At first dieted on albumin water and whey. Milk disagreed and caused renewal of diarrhœa. A mixture of whey and Savory and Moore's food was well digested, but when milk or cream was added, diarrhœa occurred. Still under treatment.

Table IX.

Age.	Weight.		Average Weekly Gain.	Food per 24 Hours.	Energy-Quotient.
Weeks.	Lb.	Oz.	Oz.		
6	6	2	...	Milk, 9 oz., S. & M. 1½ oz.	57·3
7	6	6	+ 4	,, ,, (Diarrhœa)	54·7
8	6	6	+ 0	Whey, 31½ oz. ,, 2¾ oz.	80
9	6	14	+ 8	,, ,, ,,	71·5
10	7	2	+ 4	,, ,, + cream, 2¼ oz. (Diarrhœa)	81
11	7	4	+ 2	Whey, 31½ oz. ,, omit cream	70
12	7	6	+ 2	,, ,, 4 oz.	87
13	7	12	+ 6	,, ,, ,,	83
14	8	2	+ 6	,, ,, ,,	...

From the tables it will appear that while the infants (Group *A*) fed on unmodified or simply diluted cow's milk thrived satisfactorily with an energy-quotient of about 50, in the other cases (Group *B*) the energy-quotient was considerably higher. For reasons which need not be gone into here, the number of calories obtained by a normal breast-fed infant is not a matter of absolute certainty, but from the evidence we have, it is very likely that Heubner's figures are rather too high than too low. The caloric value of the diet of the normal infant fed on cow's milk has, however, been carefully worked out in a great many cases, with results substantially agreeing with those of my Group *A*. On the other hand, I have not been able to find any studies of the caloric requirements in cases fed on milk substitutes such as were used in Group *B*. The cases are too few in number to settle the point, but so far as they go they seem to show that we cannot use the normal standard (or perhaps it would be more correct to say the standard for cow's milk) as a test of the adequacy of the diet when a food other than milk is given.

Among the reasons which suggest themselves as explanations of the high energy-quotient in Group *B* are—

1. *Over-feeding.*—It is probable that Case 7 was over-fed to some extent. The condensed milk was used less diluted than usual, and very likely a weaker mixture would have sufficed. Measurements of condensed milk, too, are obviously rough, and for these two reasons I do not lay much stress on the high energy-quotient in this case. Cases 8, 9, and 10 were treated in hospital; the calories could be accurately estimated, and there is no reason to think that too much food was given.

2. *Deficient proteid.*—This was the first explanation which presented itself—that the food was poor in proteid, and that therefore more was given to make up for the want. This, however, is not the case, as the percentage composition of the diets used shows. The proteid percentage was not lower than in human milk.

TABLE X.

	Proteid.	Fat.	Carbohydrate.
Cases 5 and 6 . .	2 2	4·4 2·5	7·2 7·2
Cases 8 and 9 . .	2·65 3·4	0·6 0·5	3 10
Case 10 . . .	2·65 1·7 2	1·86 0·36 0·4	9 12 14·5

3. *Excess of carbohydrate.*—It is difficult not to think that the high energy-quotient is connected in some way with the large

proportion of carbohydrate. An excess of this food element might simply represent unnecessary calories; it is also known to interfere with the absorption of nitrogen; and, moreover, in Cases 8, 9, and 10, part of the nitrogen was supplied as cereal nitrogen, which is less completely assimilated than that of milk.

From a practical point of view, therefore, it seems that we cannot use the normal energy-quotient in feeding with milk substitutes, but must choose one which is somewhat higher. As a basis for further observations, 70 suggests itself as a reasonable standard.

Method of calculating the energy-quotient.—The caloric value of food is estimated from their percentage composition by multiplying the proteid and carbohydrate percentages by 4·1, and the fat by 9·3. The sum of the products gives the calories per 100 parts. Multiplying this by 10, we get the calories per litre, which is practically equal to 35 fluid oz. Having once and for all determined the caloric value per oz. of any food, it is easy enough to find the number of oz. per lb. of body weight which will give any energy-quotient desired.

The caloric values per oz. of some of the more commonly employed foods is shown in this table:—

Human milk . .	19–21
Cow's milk . .	18–20
Cream (12 per cent. fat)	41
Butter-milk . .	8
,, with 1 tablespoonful of flour and 2 tablespoonfuls of sugar per litre . .	17·5
Whey . . .	6·8
Albumin water (1 egg to 10 oz.) . .	1·4
Condensed milk (1 teaspoonful of Nestle's milk to 6 tablespoonfuls of water) . .	16
Raw meat juice . .	2·3–8
Peptogenic milk . .	23
,, half cream .	20
Scott's oat flour . .	116
Quaker oats . .	115
Savory and Moore's food . . .	113
Mellin's food . .	108
Benger's food . .	105

LITERATURE.

The literature is somewhat extensive. The subject is fully discussed by Czerny and Keller.—"Des kindes Ernährung, Ernährungsstorungen, und Ernährungstherapie," Leipzig, 1906, Bd. i. cap. xiv.–xix. See also Heubner.—"Lehrbuch der Kinderheilk.," Leipzig, 1903, Bd. i. cap. vi. Oppenheimer.—*Monatsschr. f. Kinderheilk.*, 1907, May. Czerny and Steinitz.—"Diseases of Children," in Carl v. Noorden's "Metabolism and Practical Medicine," vol. iii., English edition, London, 1907 (with Bibliography).

CHRONIC ARTHRITIS: A CRITICAL RÉSUMÉ OF RECENT VIEWS ON THE PATHOLOGY OF RHEUMATOID ARTHRITIS, OSTEO-ARTHRITIS, RHEUMATIC GOUT, ARTHRITIS DEFORMANS, Etc.

By Chalmers Watson, M.D., F.R.C.P.Ed., *Assistant Physician, Royal Infirmary, Edinburgh.*

(Plate I.)

In the last few years a considerable amount of attention has been directed to the class of cases comprised in the terms rheumatoid arthritis, osteo-arthritis, rheumatic gout, arthritis deformans, etc., as a result of which authoritative writers on the subject have been led to accept as correct a classification suggested by the results of recent investigations into the clinical and pathological features of this disease. The opinion is now widely held that the disease which has long been known by the term rheumatoid arthritis is not a single disease, but comprises a group of maladies. The opinions which prevail at the present time are admirably presented in the monographs on this subject by Dr. A. E. Garrod in Allbutt's "System of Medicine," 1907. Dr. Garrod expresses his views in the following terms:—"The realisation that we are here dealing with a group of maladies and not with a single disease, is in itself a great advance, but the progress made in the direction of reconstruction is as yet scanty. This is due in no small measure to the great difficulty of so describing the clinical features of articular lesions as to convey to others a clear mental picture of the special class of cases which it is intended to describe, although to the describer the distinctive features are sufficiently obvious." The object of the present paper is—(*a*) To give a brief summary of the classifications adopted by authorities on this subject at the present time; (*b*) to refer to the results of the investigations of Goldthwaite on the differential diagnosis of the so-called rheumatoid diseases, published in 1904, which have been largely quoted as the basis for such a classification as the above; (*c*) to refer to the more recent investigations carried on by a special committee at Cambridge, some results of which have recently been published; and (*d*) to offer a few comments on the above, and especially to point out that before we can accept any classification of this group of diseases, the field of investigation must be widened considerably, less attention being directed to the clinical and pathological features in the articulations, and more attention being given to the systemic changes and to the alterations in the osseous system as a whole.

(*A*) Present Classification.—Prevailing views are admirably presented in the recently published monographs by Garrod already referred to. Four different diseases are recognised, as follows:—

1. *Rheumatoid arthritis.*—This group includes the common varieties of so-called rheumatoid arthritis, characterised by a painful and progressive affection of the joints, usually commencing in the smaller articulations, which later become deformed. Muscular atrophy is an early and prominent feature, and constitutional disturbances are present, notably an increase in the pulse rate, occasional pyrexia, and atrophic and pigmentary changes in the skin. In commenting on the visceral manifestations in this disease, Garrod writes as follows: "Although rheumatoid arthritis has all the characters of a systemic disease, its local manifestations are almost confined to the joints, muscles, and superficial structures. Visceral lesions are rare, and when they occur are usually to be ascribed to an intercurrent malady." It does not appear, however, either from a perusal of that author's paper or from a study of the literature generally, that sufficient attention has been directed to the state of the viscera to justify any pronouncement on this subject. This point will be more fully discussed in a later paper. In regard to this classification it should be stated that the author is himself doubtful of its real value. To quote his own words: "it is a question whether rheumatoid arthritis, as here described, is a distinct disease, and not rather a medley of infective arthritides of various kinds." Garrod believes that this group corresponds pretty closely to the atrophic type of Goldthwaite, referred to later.

2. *Osteo-arthritis.*—This group comprises the cases in which the large joints are especially involved, the affection being frequently monarticular, involving the hip, shoulder, or other joint. The smaller joints of the fingers and toes are not, as a rule, involved, with the exception of the metacarpal phalangeal joint of the thumb. Muscular atrophy is less pronounced than in the former group. This affection is commonly regarded as a disorder of adult life. In the author's opinion this group corresponds to the hypertrophic type of Goldthwaite's classification. A reference is made to the absence of detailed records of the pathological conditions present in this group.

3. *Spondylitis deformans.*—In this group the joints of the spine are primarily and mainly affected, any involvement of other joints being regarded as a subsidiary feature.

4. *The fourth group.*—Articular lesions of infective diseases, *e.g.*, gonorrhœa, dysentery, syphilis, pneumonia, *rheumatisme tuberculeux.* This group needs no further elaboration, but, with regard to it, reference may be made to the comment of the author himself on Class 1—the rheumatoid arthritis group—where he admits the possibility that the rheumatoid group is really a medley of infective arthritides of various kinds.

(*B*) THE WORK OF RECENT INVESTIGATORS IN AMERICA.—In a paper read at the annual meeting of the Suffolk District Medical Society in 1904, Dr. Goldthwaite of Boston presented a report on work carried out by himself and various collaborateurs, with the sole purpose of increasing our knowledge of the many features presented by the so-called rheumatoid diseases, the subject being approached by him from the clinical, pathological, bacteriological, and chemical standpoints. From the large general class of rheumatoid diseases five types are described by Goldthwaite, the essential characteristics of which are here given in brief.

1. *The chronic villous arthritis or "dry joint."*—This is not a general disease, but is essentially a local process, showing no tendency to progression. The chief characteristics of the condition are the crepitation or creaking of the joint on movement, with varying degrees of pain and tenderness on use. "In such a condition the joint fluid is probably rarely, if ever, less than normal, so that the joints are not dry, and if the villi are numerous, so that on motion the irritation or catching is marked, the internal trauma which results may be followed by a marked increase of the fluid, the same as would result if the trauma were received from the outside. The cause for this excess of fluid is purely mechanical, and is not due to a general disease or to any chemical or diathetic condition. It is absorbed under compression and quiet, and reappears again if the irritation is continued. When such a condition has been present for any considerable length of time, degenerative changes take place, and tissues of a higher type are replaced by tissues of a lower." No details of the pathological conditions actually observed, or previously described, in the early or later stages of this condition, are given by the author.

2. *The second type—atrophic arthritis* or *rheumatoid arthritis*—defined as a progressive disease, resulting in marked distortion and joint crippling, with the essential pathological features, one of atrophy, in which the joint membranes, the cartilages, the bones, and in the exposed joints even the skin, all show the change. "It is because of the atrophy, which is such a constant feature, that the term atrophic arthritis is used, and it represents an attempt to use terms for which there is some scientific reason." This group corresponds to the "rheumatoid arthritis" in the former classification.

3. *The third type—hypertrophic arthritis*—or, as it was formerly called, *osteo-arthritis*—may be either a local or a general process, and is characterised by a thickening at the edge of the articular cartilage, or at the attachments of the ligaments, forming ridges or nodes, which become ossified, and interfere in varying degrees with joint movement. As the process extends, the ends of the bones forming the articulations usually become sclerosed, and are much more dense than normal, and with this the central portion of the articular cartilages at the points of pressure may be absorbed. The essential feature of this type of disease is hypertrophy of the cartilage and bone. It is for this reason that the

new term is used. This group corresponds to the osteo-arthritis group in Garrod's nomenclature. The costo-vertebral articulations are frequently involved in this group—the spondylitis deformans group of Garrod's classification.

4. *The fourth type.*—The *infective arthritis* is by far the most common, and includes most of the cases commonly spoken of as acute or chronic rheumatism, and as septic arthritis, as well as many formerly spoken of as arthritis deformans. This group closely corresponds to Group 4 in Garrod's classification.

5. *Fifth type—chronic gout.*—A form in which deposits of urate of soda takes place in the soft structures about the joints, with some bone absorption adjacent to the deposit.

Dr. Goldthwaite's paper is accompanied by a series of admirable photographs and skiagrams in illustration of the author's views.

In a communication on this subject, made at the same meeting, Dr. Bradford made two important comments on this classification. He pointed out that in a series of over 100 cases which had been under careful observation, great difficulty was encountered in classifying the cases sharply into "atrophic" or "hypertrophic arthritis"; he further pointed out that in most of the cases the patient appeared to be suffering from the effects of a systemic disturbance attacking different parts of the body, though to a greater degree in some than in others.

(*C*) THE WORK OF THE COMMITTEE FOR THE STUDY OF SPECIAL DISEASES AT CAMBRIDGE.—For the past eighteen months the Committee for the Study of Special Diseases at Cambridge have directed their attention to the study of so-called rheumatoid arthritis. This investigation, which is under the control of Dr. T. S. P. Strangeways, has been conducted along very comprehensive lines, and for this reason it marks a new era in the history of the disease. A series of papers, giving the results of their researches, has already been published in the Bulletin of the Committee. The more important results are given in the following papers:—

1. "A Report on some Points in the Etiology and Onset of 200 Cases of so-called Rheumatoid Arthritis," by T. S. P. Strangeways and J. Barnes Burt.

2. "A Study of Joints from Cases of Rheumatoid Arthritis and Chronic Gout by means of Skiagrams and Dissection of the Affected Parts," by T. S. P. Strangeways.

3. "The Morbid Histology of some Cases of Rheumatoid Arthritis," by G. W. Nicholson.

4. "A Study of Skiagrams from the Hands of 100 Cases of so-called Rheumatoid Arthritis and Chronic Gout," by T. S. P. Strangeways and J. Barnes Burt.

The views of these authors on classification may be roughly gauged from the statement in their report on 200 cases of

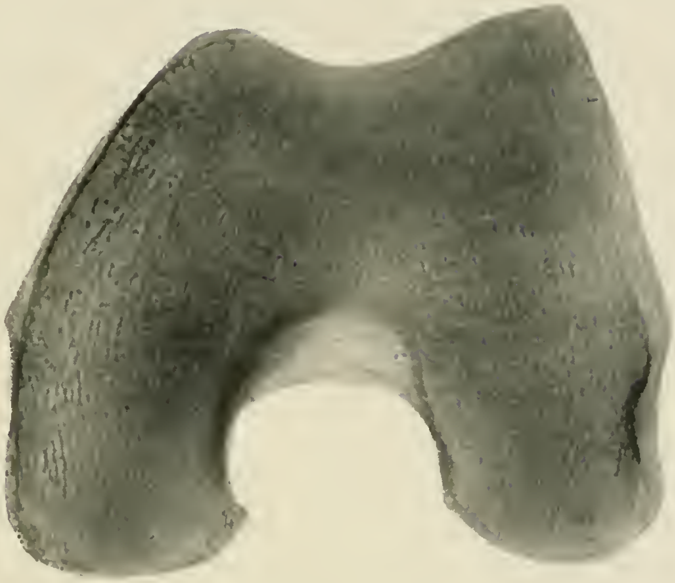

FIG. 1.—Skiagram of lower end of femur of an apparently healthy stout woman æt. 21. Cf. with Fig. 2.

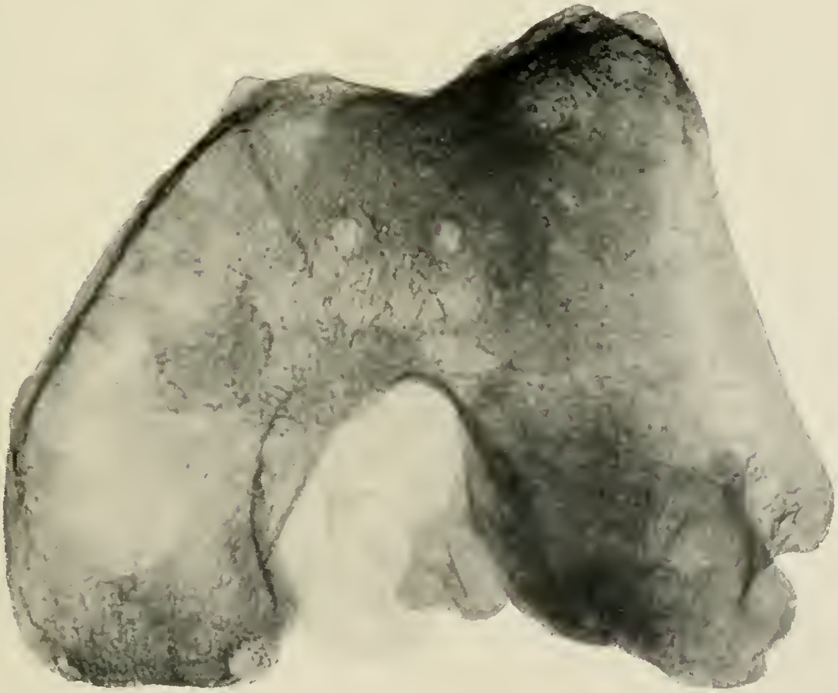

FIG. 2.—Skiagram of lower end of femur of an emaciated woman æt. 21, affected with advanced rheumatoid arthritis; taken on same plate as Fig. 1. The extreme degree of rarefaction of the bone is shown by the pale areas in the figures. A general enlargement of the bone is a striking feature.

rheumatoid arthritis, to the effect that "although we have reported on these 200 cases as cases of typical rheumatoid arthritis, we use the term with great reluctance, for we are convinced, as indeed any one familiar with the disease must be, that several distinct diseases are called by this unfortunate name. There can be no doubt that a number of conditions are included in this report, which, with sufficient knowledge, could be divided into separate groups if not into distinct diseases." In this series of 200 cases it is of interest to note that a history of dyspepsia was present in 39 per cent. of the first series and in 35 per cent. in the second series. No reference is made to the state of the viscera in the post-mortem records so far recorded by these investigators. An admirable series of skiagrams of the phalangeal joints are shown in these papers, and further contributions on the subject are promised in the forthcoming year.

(*D*) COMMENTS ON THE ABOVE VIEWS ON CLASSIFICATION.—During the past years I have taken a special interest in this subject, and have examined a large number of patients affected with this disease in its early and late stages, and have had the co-operation of Dr. Hope Fowler, of the Electrical Department of the Royal Infirmary, Edinburgh, in securing a large number of skiagrams from typical cases of this disease at all stages of its course. At my suggestion my friend Dr. Catharine Clark has made a careful examination into the state of the viscera in some well-marked examples of rheumatoid arthritis, in patients who died when under her observation in the Parish Hospital. Her results are in course of publication, and although as yet too few to allow of any statement being made on the subject, they are of sufficient interest and importance to indicate the necessity of a careful examination being made into the state of all the viscera and tissues in this disease. In particular, the results confirm the importance of the observations of Charcot and Trousseau—the significance of which appears to have been lost sight of—on the occurrence of chronic nephritis in cases of this disease. I believe that no real advance in our knowledge of this disease will be made until more attention is directed to the tissues *other than the articulations.* In this connection more attention should, in my opinion, be given to the occurrence of changes in the texture of the bones, other than those observed at their articular ends. In illustration, I may refer to the two skiagrams in Plate I. These will be fully described in a later paper, but they are shown here because they illustrate an important feature in the pathology of this disease, which has received, so far as I am aware, little or no attention. Fig. 2 shows a skiagram of the lower end of the femur of a typical case of advanced rheumatoid arthritis in a young woman;[1] Fig. 1 shows the appearance in the corresponding part of the bone in a healthy woman of the same age, but of considerably larger build, who died from acute corrosive poisoning. A study of these skiagrams (and also of the joints as a whole) shows clearly that the diseased joint does not correspond to the atrophic type of Goldthwaite; equally clearly it does not correspond to the hypertrophic type described by that author. The skiagram illustrates two points—(*a*) An extensive rarefaction of the bony tissue—this has recently been recognised to be an important feature of the articular end of the bones in this disease; and (*b*) a considerable enlargement of the bone as a whole, a feature to which, so far as I am aware, little or no attention has been directed. A similar condition is very frequently observed in the phalanges, but little or no reference is made to it in the literature of the subject. Until these and other points are further investigated, it is, I believe, inadvisable to attempt any classification whatever of this group of diseases. An essential preliminary to any attempts at classification is, in my judgment, a widening of the field of investigation, less attention being devoted to the clinical and pathological features in the joints, and more attention given to the systemic changes and to the alterations in the osseous system as a whole.

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[1] I am indebted to Mr. Alexis Thomson for this preparation.

A TEN YEARS' STUDY OF CUPAR WATER SUPPLY (CLATTO WATERWORKS), WITH SPECIAL REFERENCE TO THE GERM-CONTENT THEREOF.

By C. E. Douglas, M.D., F.R.C.S.Ed., D.P.H. (Camb.), *Medical Officer of Health, Cupar-Fife.*

The water supply of Cupar-Fife, a burgh having about 4500 of a population, is obtained from a gathering ground at Clatto, about five miles distant in a south-easterly direction, 600 ft. above sea-level and about 500 ft. above the mean level of Cupar. The supply is an upland surface water, obtained from numerous "feeders" from the neighbouring higher levels, the land being cultivated, some of it arable, the rest pasture land. The gathering ground itself has a water surface, when full, of about 820 acres of catchment area, and gives a supply of 280,600 gallons per day; there is therefore a supply about 60 gallons per head of the population. The soil is of the limestone formation, and the natural springs in the neighbourhood are of very hard water. This is not the case, however, with Clatto water, as the following analysis shows:—

1. *Clatto water above filter*, December 6, 1904 (in parts per 100,000).

Total solids	13·5
Free ammonia	0·006
Albuminoid	0·028

Chlorine	1·35
Oxygen consumed	0·253
Nitrates	a trace
Nitrites	*nil*
Hardness	12·41

2. *Water from tap in Cupar*, October 13, 1904.

Total solids	13·4
Free ammonia	0·000
Albuminoid	0·021
Chlorine	1·2
Oxygen consumed	0·173
Nitrates	a trace
Nitrites	*nil*
Hardness	11·2

That the water has not varied appreciably in thirteen years, the following analysis will show :—

3. *Tap in Cupar*, December 8, 1907.

Total solids	11·4
Free ammonia	0·000
Albuminoid	0·013
Chlorine	1·3
Nitrates	0·
Nitrites	0·
Oxygen consumed	0·072
Hardness	13·31

These analyses compare favourably with

4. *A shallow well close by.*

Total solids	21·8
Free ammonia	0·024
Albuminoid	0·014
Chlorine	1·4
Nitrites	*nil*
Nitrates	a trace
Hardness	18·49 parts per 100,000

The water is purified by sand filtration. The filtering medium consists of washed quarry clips at the bottom, covered by clean washed gravel, assorted into 5° of fineness from the size of hazelnuts to such as will pass through a 16-mesh sieve and be retained by a 64-mesh sieve. Altogether this gravel bed is 2 ft. in depth. Two feet of clean washed fine sand overlay this bed. When the filters become clogged the top is scraped off and laid aside. This is allowed to weather thoroughly, and is then well washed in a mechanical sand washer acting under a head of water; it can be used again indefinitely. Each filter is usually cleaned once in six weeks, the indication for this being the lowering of the level in the clear water cisterns into which the water passes immediately after filtration. When the slime layer on the surface of the filters becomes too thick, the water cannot pass through so quickly as to maintain the level of the water on the filter, and the filter in question has then to be cleaned. The total filtration area, when all filters are in use, is 1214 square yards. With the average daily flow of water this gives 272·65 gallons per square yard of filtering area per twenty-four hours, equal to 1·26 gallons per square foot per hour—in other words, a filtration speed of only 4·848 ft. in twenty-four hours.

After filtration, the water passes through a 7-in. pipe to a small reservoir three miles nearer Cupar, which contains always about a day's supply, 300,000 gallons or thereby. At the time when these observations were begun, in 1895, this pipe had never been touched since it was laid down nearly twenty years before, and its calibre was much diminished by incrustation. So much was this the case that it was proposed to take it up and replace it by a new 7-in. pipe at very considerable cost. Before doing so, however, it was resolved to have the Glenfield patent scraping process applied. The apparatus used consists of a machine which is driven through the pipe by the pressure of the water. There are two distinct portions of the machine, the front portion carrying a pair of steel scrapers, working one behind the other, and being connected by a swivel-joint with two steel propelling pistons also working one behind the other. This apparatus is put into the pipe at a manhole just below the filters, and driven down by the force of the water behind it till it emerges at the next manhole situated about a mile further down. During its passage it has to be most carefully followed by the men in charge. They have previously located the line of the pipe by auscultation through a long iron stethoscope, and indicated its track by a series of little flags. If the scraper is travelling, its progress can be detected by the low grinding noise made by it in encountering the incrustation. While it is travelling the detached incrustation goes down before it. Sometimes it becomes fixed. The increased pressure of the water behind it may overcome the obstruction. If not, it has to be cut down upon and started once more.

This process, applied for the first time to this pipe in 1895, proved very successful. The incrustation was fully three-quarters of an inch in thickness, making a difference of 1½ in. on the calibre of the pipe, and causing, therefore, a great diminution in the available supply. Since the adoption of this process there has been no difficulty in keeping up the necessary head of water, and every year the sanitary staff have applied the Glenfield process, with complete success.

The bacteriological examination of the water was carried out as follows:—

Observations were made, as far as possible, once a month at least. The unfiltered water, that from below the filter or filters, and water from a tap in Cupar, were all examined. In each case two plates were poured, the mean of each double observation being taken as the result; a control of each observation was made. Ordinary nutrient gelatin was used, and incubation was at room temperature, except in the experiments where observations were made on agar jelly and at blood heat. As the nutrient medium is of great importance in a research such as this, and as many methods of its preparation have been suggested, I describe the mode of preparation finally adopted by me, after many trials.

Half a pound of finely minced beef-steak was heated in a goblet for forty-five minutes with 500 c.c. distilled water. This was filtered, hot water added to the beef in goblet and filtered till 500 c.c. were obtained. Five grms. salt and 2·5 grms. peptone were added, and the flask well shaken. It was placed in the Koch pot for twenty minutes. Fifty grms. gold-leaf gelatin were torn up and put in a large beaker. The fluid extract was poured on this and the beaker was put in the Koch pot till the gelatin dissolved, at about 70° C. It was then taken out, the white of one egg, slightly beaten up, was added, and placed again in the Koch pot for half an hour at 60° C. Two c.c. were then removed, put in a porcelain dish with a little hot distilled water and titrated with $\frac{N}{10}$ KOH, against decinormal H_2SO_4, with phenolphthalein as indicator. If, for instance, 2 c.c. require 0·7 c.c. $\frac{N}{10}$ KOH = 17·5 c.c. normal KOH to neutralise 500 c.c. The required amount of normal KOH was then added to the mixture and heated twenty minutes in the Koch pot. It was then filtered through one layer of folded filter paper, with a small filter paper at bottom to strengthen the point. The filtering was done in the Koch pot, taking care to be well below boiling point, and took about an hour and a half. It was then run into tubes, and finished with the usual steaming for twenty minutes in the Koch pot at 100° C. for three days in succession. I have described this method in detail because it avoids the two chief difficulties in the preparation of nutrient gelatin—the lowering of its melting point, and the diminution of alkalinity. I seldom had any difficulty with the former, and I can say that the nutrient thus prepared will keep sufficiently alkaline for three months; after which it begins to develop acidity.

The counting of colonies was done in the usual manner on a Wolffhügel counting-board. The number of colonies in the unfiltered water was first ascertained, and then that in the filtered waters, the result being found by a simple calculation, and expressed as the percentage of organisms removed by filtration.

The objects of the research were chiefly to determine the filtering power of the filter-beds, and to determine whether the water as delivered in Cupar was as germ-free as that at the filters themselves. A minor point of inquiry was as to the effect, if any, of changes in the alkalinity of the water upon the germ-content. At the time when this investigation was begun the life-history of the organisms of water was being much investigated, and it was thought advisable, as the media in which organisms flourish require always to be alkaline, and not too alkaline, to determine whether alterations in the alkalinity of a water were accompanied by any change in the number of organisms present. To this end the alkalinity of the water was determined on each occasion for a period of three years. During that time, as will be seen in the tables, the alkalinity varied considerably, from 5·5 parts per 100,000 to 11 parts, a variation of just 50 per cent. Generally speaking, the alkalinity appears to be rather greater in winter than in summer, but any variations do not appear to run *pari passu* with variations in the number of organisms. Thus, when the alkalinity was at its lowest figure of 5·5 parts per 100,000, the unfiltered water contained 1400 organisms per c.c. (March 30, 1895). On another occasion, when the alkalinity was at its highest, 11 parts per 100,000, the unfiltered water was very germ-free, having only 113 per c.c. (November 23, 1895). So that it may be taken that the germ-content of a water has no relation to its alkalinity. The germ-content of the unfiltered Clatto water varied considerably. The mean of all the observations was 976 per c.c. The largest number occurred in August 1900, with 7433 per c.c.; the lowest in November 1904, with 98. The usual

TABLE I.—*Showing Germ-content of Unfiltered Clatto Water Monthly. Years* 1895–1904 *inclusive.*

Year.	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	Highest.	Lowest.	Mean.
January .	4628	475	...	444	1177	...	1430	...	2350	654	4628	444	1596
February	1590	223	400	574	827	...	1280	1714	1060	...	1714	223	958
March .	1400	2188	795	1774	525	...	...	228	964	220	2188	220	936
April . .	250	226	206	800	128	1536	450	290	...	185	1536	128	541
May . .	1280	255	563	700	223	700	...	3810	126	182	3810	126	871
June . .	296	410	355	3150	138	596	196	1300	...	273	1300	138	746
July . .	370	261	...	...	357	6857	325	432	420	1071	6857	261	1261
August .	1800	895	552	6845	481	7433	104	...	1105	120	7433	104	2148
September	486	1430	400	753	...	2915	307	242	...	200	2915	200	841
October .	168	820	330	...	255	272	590	...	930	320	930	168	460
November	260	300	483	370	...	563	360	1550	877	98	1550	98	540
December	620	1170	1230	957	695	442	...	704	...	117	1230	117	741
Mean. .	1095	720	532	1576	480	2368	560	1141	979	312	...	...	969

Monthly mean, 969. Yearly mean, 1976.

excess in winter was not observed. The mean monthly figure being 969, this was exceeded by August, January, and July in order; February, March, and September followed, these being nearest to the mean; while May, June, December, April, November, and October followed in order, October having only 460 as its mean. It is usual for the winter months to show the greatest number of organisms, and this is explained by the supposition that in winter the washings of cultivated land are being poured into the streams. The fact that ours is an upland surface water with comparatively little cultivated land round it, may account for the difference, as our catchment area is chiefly surrounded by permanent pasture which does not greatly vary during the year.

Effect of filtration upon the germ-content. For the first three years during which these observations were conducted there was only one filter in existence. It used to become too thickly coated on the surface after a period of about six weeks or two months, and required cleaning. Whilst it was being cleaned the water was allowed to pass to the main pipe in an unfiltered condition. The resulting differences in the germ-content is well shown in Table II., where the dates of cleaning the filter are shown. It also shows the fact, now well known, that a filter does not act as such for about a week after the water is admitted to it, not until the slime layer of organic deposit, the real filter in fact, has been formed. Thus in January 1895 the unfiltered water containing 4628 organisms, the filter was cleaned 27th January, when the water in Cupar had 1440, a diminution of only 62 per cent. On 1st February it was 530, or 88 per cent., and on 4th March it was 77, or 95·2 per cent. organisms removed. Similarly the same effect may be seen on referring to 15th March and 5th October of 1895, and January and August 1896. In the end of 1896 something of the same occurred when, owing to long-continued frost, the filter-bed was frozen and water had to be run past it in order to keep up the supply. In 1897, on 16th February, 10th April, 22nd May, 12th June, and 20th September, the same thing is seen, showing thus the value of filtration, and the need of more than one filter, of a system of filters, in order that filtration may be constantly carried out. At the end of these three years, two more, rather smaller filter-beds were provided, and now a regular rotation is observed, each filter-bed being cleaned about once in every six weeks, and allowed to rest for a week afterwards, in order that the filtering layer of organic slime may be produced. It will be seen from Table III., which shows the results from all the filters for the seven years, that filtration generally is very complete, and that usually over 90 per cent. of organisms are removed by sand filtration.

The germ-content of the Cupar water in Cupar was in most cases greater than at the filter, though much less than in the un-

Table II.—*Germ-content of Clatto Water, Unfiltered, and Water below Filter and in Cupar. Also Estimations of Alkalinity in Parts of* $Ca.CO_2$ *per* 100,000.

Date.	Clatto.	Old Filter.	Percentage of Organisms Removed.	Cupar.	Percentage of Organisms Removed.	Alkalinity, in Parts per 100,000 $Ca.CO_3$.	Remarks. Filters Cleaned.
1895.							
Jan. 24	4628	...	...	...	...	11	
,, 27	...	...	...	1440	62	...	
							January 27.
Feb. 1	...	...	...	530	88	...	
,, 28	1590	...	..	...	...	9	
Mar. 4	...	...	...	77	95·2	...	
,, 15	...	...	...	158	88·8	...	March 15.
,, 19	...	...	...	324	77·7	...	
,, 23	...	...	...	515	64	...	
,, 30	1400	...	...	...	...	5·5	
April 4	...	...	...	286	94	...	
,, 24	250	...	...	50	80	7	
May 15	1280	...	...	8	99·4	8	
,, 22	...	...	...	87	95	...	
							May 24, Glenfield process applied.
,, 31	...	...	...	211	83·6	...	
June 7	296	...	...	15	95	9	
,, 18	...	...	...	70	76	...	
July 11	...	...	...	24	93·6	...	July 11.
,, 13	370	..	...	20	94	7	
Aug. 22	...	38	95·6	24	98	...	
							August 23.
,, 25	1900	...	...	18	96·3	9	
Sept. 28	...	...	...	24	95	...	
,, 22	486	21	95·7	17	96	11	
							October 5.
Oct. 8	...	...	...	70	68·6	...	
,, 10	...	...	...	56	74·9	...	
,, 12	223	39	88·6	10	95	10	
,, 31	113	15	86·6	18	84·1	11	
Nov. 23	260	22	91·5	21	92	11	
Dec. 23	620	6	98	9	98·6	...	
1896.							
Jan. 12	...	...	...	33	93	...	
							January 13.
,, 14	...	...	...	195	59	...	
,, 18	...	...	...	21	95·6	...	
,, 23	475	25	94·8	43	91	7	
Feb. 20	223	12	94·7	9	96	8	
Mar. 3	...	...	...	125	44	...	March 3.
,, 8	...	...	...	64	97·1	...	
,, 25	2188	54	97·5	...	...	7·5	Glenfield process.
,, 29	...	...	...	24	99	...	
April 11	226	27	88·1	...	...	7·5	
							April 14.

TABLE II.—*continued.*

Date.	Clatto.	Old Filter.	Percentage of Organisms Removed.	Cupar.	Percentage of Organisms Removed.	Alkalinity, in Parts per 100,000 $Ca.CO_3$.	Remarks. Filters Cleaned.
1896.							
April 26	...	...	...	48	79	...	
May 23	255	72	72	52	80	9·5	
,, 31	...	...	...	20	92	...	
June 25	410	16	96	40	90·3	9·5	
							July 6.
July 14	...	...	...	70	88	...	
,, 22	261	76	70·9	73	72	...	
							August 23.
Aug. 27	895	460	48·7	137	84·7	9	
Sept. 4	...	...	...	44	95·1	...	
,, 29	1430	35	97·6	80	95·4	8·5	
							October 12.
Oct. 29	820	44	94·7	10	98·8	9·5	
Nov. 21	300	36	88	48	84	9	
							November 22 Frost. Running past filter to keep up supply.
Dec. 26	1170	58	95	380	67	7·5	
1897.							
Feb. 10	400	16	96	30	92·5	7·5	
							February 16.
,, 17	...	...	...	1878	...	...	
Mar. 3	795	61	92·4	12	98·5	7·5	Glenfield process.
							April 10.
April 25	206	36	87·9	64	69	7	
							May 22.
May 25	563	44	92	147	75	8·5	
							June 3.
June 12	136	40	70	147	...	7·5	
,, 29	574	...	...	102	82·3	8	
Aug. 29	552	22	96	48	91	...	
Sept. 20	400	980	...	436	...	...	Sept. 20.
							Oct. 1. Pipe scraped; new filter at work.
Oct. 12	330	86	74	67	80	9	
Nov. 28	483	40	91·8	114	76	9	
Dec. 31	1230	145	88	83	93	...	All filters working.

TABLE III.—*Results of Filtration at both Filters, and in Cupar, for Seven Years*, 1898–1904 *inclusive.*

Date.	Clatto.	Old Filter.	Percentage of Organisms Removed.	New Filter.	Percentage of Organisms Removed.	Tap in Cupar.	Percentage of Organisms Removed.	Remarks.
1898.								
Jan. 30.	444	...	...	248	46	55	87·7	January 18. Old filter cleaned.
Feb. 24	574	970	...	450	...	26	95·9	March 24. Glenfield process.
Mar. 30	1174	75	94	33	95·4	320	72·8	
May 8	800	32	96	12	98·5	75	80·6	
,, 30	700	117	83·3	90	87·2	177	75	
June 13	3150	16	99·5	10	99·6	...	...	
Aug. 28	6845	19	99·8	4	99·5	81	98·3	
Sept. 22	758	30	96	62	92	114	85	
Nov. 20	370	156	58	89	78	233	37	
Dec. 28	957	22	97·7	8	99·2	135	85·7	
1899.								
Jan. 7	...	...	...	...	...	180	...	Balgarvie, 1078; Trynlaw, 2550; South Road, 11,000.
,, 19	1177	661	43	45	61	319	73·8	
Feb. 23	827	234	71·8	12	85	120	85·5	
								March 22. Glenfield process.
Mar. 30	525	3	99·4	40	93·8	30	94·4	
April 30	128	11	91·5	12	90·7	32	75	
May 28	223	46	79·6	60	73·4	102	51	
June 25	138	22	84	28	79·6	20	85·5	
July 23	357	33	90·8	39	91·6	46	87	
Aug. 31	481	32	93·4	36	92·5	108	77·6	
Oct. 17	255	30	88·3	...	...	27	89·5	
Dec. 10	695	3	99·6	6	99·2	54	91·8	Balgarvie, 9; Trynlaw, 7; South Road, 17.
,, 31	...	...	...	...	...	10	...	
1900.								
April 22	1536	103	93	308	80	134	91·3	
May 20	700	97	86	30	93·5	26	96·2	
June 24	596	44	92·7	4	99·2	65	89·1	
July 29	6857	21	97·7	10	99·9	38	99·5	
Aug. 26	7443	26	99·7	5	99·9	53	99·3	
Sept. 23	2925	6	99·9	24	99·2	38	98·7	
Oct. 28	272	28	89·7	12	95·6	46	85·1	
Nov. 25	563	10	98·3	8	98·6	46	92	
Dec. 23	442	8	98·3	5	98·9	15	96	

TABLE III.—*continued.*

Date.	Clatto.	Old Filter.	Percentage of Organisms Removed.	New Filter.	Percentage of Organisms Removed.	Tap in Cupar.	Percentage of Organisms Removed.	Remarks.
1901.								
Jan.	1430	152	89·4	157	89·1	63	95·6	
Feb.	1280	160	87·5	182	85·8	97	94·5	
April	450	24	94·7	7	98 5	107	76	
June	196	2	99	12	93·9	28	85·3	
July	325	...	...	...	100	14	95·7	
Aug.	104	54	49	4	96	44	58	
Oct.	307	24	92·2	2	99·4	234	20·6	
Nov.	590	13	97·8	3	99·5	21	96·5	
Dec.	360	14	96·2	12	97	10	97·3	
1902.								
Feb.	1714	145	91·6	...	...	183	89·4	
Mar.	223	...	...	...	...	26	88·4	March 27. Glenfield process.
April	290	20	93·2	8	97·3	9	94·4	
May	3810	...	...	16	99·6	4	99·9	
June	1300	...	100	12	99·1	23	98·3	
July	433	40	90·8	4	99·1	155	65	
Sept.	242	15	93·8	12	95	48	80	
Nov.	1550	12	99·5	12	96·5	31	98	
Dec.	704	21	97	...	...	20	96·9	
1903.								
Jan.	2350	22	99	...	...	39	98·7	
Feb.	1060	47	95·5	45	95·7	27	97·4	
Mar.	964	66	95·6	25	97·4	78	91·9	March 12. Glenfield process.
May	126	All	plates	spoil	ed.			
July	480	16	98·8	14	98·5	63	93·1	
Aug.	1105	4	99·6	5	99·5	46	98·5	
Oct.	930	25	97·3	...	..	...	...	
Nov.	877	26	97·1	...	...	12	98·6	
1904.								
Jan. 1	654	4	99·4	8	98·8	32	95·1	
								March 17. Glenfield process.
Mar. 31	220	30	87	89	59·9	143	35	
April 26	185	45	75·5	...	...	23	87·6	
May 25	182	36	80	...	..	78	58	
June 29	273	28	89·8	13	95·3	61	78	
July 10	1071	...	...	45	95·8	55	95	
Aug. 28	120	8	96·1	...	...	62	70	
Sept. 29	200	14	93	24	88	100	50	
Oct. 27	320	10	97	...	...	33	90	
Nov. 17	98	9	91	...	...	44	56	
,, 26	117	12	90	6	95	4	97	

filtered water. It is probably that this is from germ proliferation whilst standing in the pipes. It would appear as if the germs multiplied more quickly in still water. It is well known that stagnant water teems with organisms. In a sample of water that is allowed to stand for a few hours the organisms multiply in a geometrical progression. And so, in the comparative quiet of the pipes, they seem to proliferate. An experiment to show this was performed thus. The germ-content for Cupar water was taken on a day, 7th January 1899. It was 180 per c.c. Three public water taps were tested, the water being taken as it stood in the pipe without previously having run some off. These three gave the very large figures of 1078, 2550, and 11,000 respectively, instead of 180. The same experiment was repeated at the same taps, but this time running the water for a little before taking the sample.

As before, the germ-content of the same tap in Cupar was taken, and found to be 10 per c.c. The road taps gave on this occasion 9, 7, and 17 respectively, showing very clearly the difference between water that has stood and water that has been taken fresh running, so to speak.

The organisms found, when plated out, and examined as to their expansion on the different media were those usually got in water. *B. mesentericus*, *B. aquatilis*, and *Micrococcus violaceus* were all identified. Except *Staphylococcus pyogenes albus*, no pathogenic organisms were seen. Indeed, of organisms that would flourish at 37° C. (blood temperature) there seemed very few. Thus in November 1901 the unfiltered water gave 390 organisms at 18° C. (room temperature), but only thirteen at blood heat. On the same date the water as delivered in Cupar had twenty-one organisms at room temperature; only five at blood heat.

Table IV.

Date.	Clatto.		Cupar.	
	At 18° C.	At 37° C.	At 18° C.	At 37° C.
1902.				
January	...	20	...	20
February	1714	16	183	0
March	223	2	26	0
May	3810	10	4	0
June	1300	0	23	14
July	433	0	155	0

Table IV. gives the figures for six monthly experiments, showing the great difference between the presumably harmless water organisms which flourish at room temperature, and the presumably pathogenic organisms which will live at blood temperature.

Since this ten years' series of observations was concluded, observations have been made at irregular periods as occasion served. The results have been in line with the main body of observations. Thus the water was examined 16th August 1906—

Unfiltered at 18° C. = 150 per c.c.
Filtered ,, = 6 ,,
Tap in Cupar ,, = 75 ,,
Unfiltered at 37° C. = 0 ,,
Tap in Cupar ,, = 1 colony.

Finally, a specimen taken 8th December 1907 showed the chemical analysis already given. The germ-content of the Clatto unfiltered water was 913 colonies per c.c., whilst the water from filters and tap in Cupar were both sterile.

These observations tend to show—

1. That the water in a catchment area may differ chemically from that of the underlying geological formation:

2. That the Glenfield scraping process is of value in maintaining the output of a supply pipe at its proper figure, and may even, as in this case, save a community the very large cost of putting down a new supply pipe:

3. That the range of alkalinity observed in this water supply does not appear to have any effect upon the germ-content:

4. That the mean germ-content of this upland surface water is between 900 and 1000 per c.c.:

5. That the method of sand filtration is capable of removing over 90 per cent. of organisms when the filters are in good working order:

6. That filter-beds cleansed about once in six weeks, and should be allowed at least a week's rest after cleansing before being put again into use:

7. That the germ-content of a water supply is distinctly greater at the point of delivery than as issuing from the filter-bed:

8. That this increase is probably due to the state of comparative rest in the pipe:

9. That in an upland surface water the number of organisms which will grow at blood temperature is a very small proportion of those growing at room temperature.

SOME CLINICAL ACCESSORIES.[1]

By David M. Barcroft, M.B., Ch.B.

In electing me a President of our ancient Society, you have conferred on me one of the greatest honours that is in the gift of any corporated body under the ægis of our Alma Mater. For this I sincerely thank you, and will do everything in my power during my term of office to justify the confidence you have placed in me, and maintain the dignity of our Society.

It has been a source of considerable difficulty to me to hit upon a subject for my presidential address, that on the one hand avoids being commonplace, and on the other is of sufficient interest to warrant my placing it before you.

It occurred to me that there might be a certain number of members present who have not proceeded far with their clinical work, to whom it will be of interest to know something of the history, not of clinical medicine indeed, but of some of those accessories which are in constant use. Perhaps I should here apologise to our distinguish senior members, to whom much of what I say must necessarily be familiar.

Clinical medicine has been very greatly modified with the enormous advances which have from time to time been made in our knowledge of physiology and morbid anatomy. The nebula of empiricism has gradually evolved into the more complete world of scientific fact. Whilst there is still room for the continuance of this process, much has been accomplished, and many, as it were, crystals of clinical knowledge have separated out and become concrete.

Interesting as it might be to inquire into the remote origin of things, time hardly permits me to do more than to review a few of the principal discoveries of the last century and a half.

In point of time and also probably in that of importance, "Percussion" ranks first. The term as we use it is really a contraction of the more accurate term, "Mediate Percussion," which is used in contra-distinction to that of "Immediate Percussion." Inspection and succussion were known and described by the authorities since Hippocrates, but it was only in the middle of the eighteenth century when it occurred to Auenbrugger of Vienna that the familiar congratulatory thump on the chest and the resultant hollow sound which is commonly associated with robust health, might not be without significance. For seven years he carried on his laborious and, he says, disgusting researches, ultimately publishing a small pamphlet with his discovery. This attracted two passing notices, lapsed into oblivion, and its author died without realising the magnitude of his discovery. After thirty years the great Corvisart unearthed the discovery of Auenbrugger, and in 1808 published a translation into French of the Austrian's *Inventum Novum*, which made the whole of Europe conversant with his researches. The method was that of "Immediate Percussion," and the fingers were used as the plessor. It was laid down that the four fingers were to be used, united in a line, and that the thumb was to be placed in opposition to them at the junction of the second and third phalanges of the index finger, to maintain the fingers in close apposition. It was further laid down, that the subject be sitting up and that the chest be covered, as this position gives the best sound and the clatter of the fingers striking the naked skin is avoided. The tips of the fingers were to be used, the chest struck perpendicularly, gently, and quickly. The technique had to be rigidly adhered to, but very great experience was necessary before any reliable information could be obtained.

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[1] A Presidential Address delivered before the Royal Medical Society, November 15, 1907.

Even more epoch-making than the foregoing was the immortal work of another Frenchman, entitled "Mediate Percussion, and the Signs obtained by this New Means of Investigation in Diseases of the Chest and Abdomen." Piorry published his treatise in 1828, and dedicated it to Auenbrugger, Corvisart, and Laennec.

In the preface occurs the following, almost apology, which, in the light of modern experience, seems to have a touch of sarcasm in it:—"Many commendable practitioners think that the use of the means I suggest might be replaced by that of direct or immediate percussion. The value I attach to their opinion makes me endeavour to establish a parallel between the two means of diagnosis. Perhaps I deceive myself in the preference that seems to me to be due to mediate percussion. Perhaps the perceptions of other experimenters are better developed than mine. Perhaps they discover by Auenbrugger's method shades of resonance indistinguishable to me, which I can easily make out since I have used my pleximeter; however, I dare to hope that, to say the least of it, my research on percussion, repeated and perfected, will dissipate some of the many obscurities surrounding the art of diagnosis."

Piorry's book is quite short, some 350 pages of large type with illustrations. His work was mainly done in the post-mortem room, where he could immediately prove or disprove his observations. The pleximeter which he used was of ivory, but we find this significant passage: "A good many English or American doctors, who have honoured me by being present at my demonstrations, have endeavoured to simplify my procedure by using their fingers as a pleximeter. It is the index finger of the left hand which fulfils this function, but it only does so imperfectly: it gives less sound than the ivory plate, the skin which covers it deadens the impulse; it presents a round surface which is not easy to strike perpendicularly; the shock which it communicates to the subjacent tissues may be painful or dangerous, because of the limited surface with which it is in touch. Moreover, the ordinary pleximeter is itself of extreme simplicity; in its absence a coin may be requisitioned."

Piorry describes eight principal sounds obtained by mediate percussion:—

Ostéal, over the forehead; fémoral, over the thigh and shoulder; jécoral, over the liver; cardial, over the heart; intestinal, over the umbilical region; humorique, over the epigastrium and left inguinal region; stomacal, over the left hypochondrium and right inguinal regions; pulmonal, in the supraclavicular regions and thorax. Also hydatidque, over a hydatid tumour.

I should say that Piorry used the pulp rather than the tip of the fingers as his plessor, and recommended that the patient should have the pleximeter in direct contact with the skin.

Some of Piorry's rules are as follows:—

"The position of the patient must be varied according to the organ to be examined and the nature of the disease we expect to find. In general, the patient must not rest on a very soft bed, nor must there be any noise in the room when an examination is being made. If one has not reason to expect an effusion, the first position will often answer for a whole examination, but when fluids or movable bodies are suspected, then the position of the patient must be varied frequently." This last rule, says Piorry, is pregnant in practical results.

The following, which in the original is in italics, seems to us not in all respects to be borne out by experience, namely: "It is necessary that the pleximeter be *lightly* applied to the part to be examined, and so maintained that it may be part of the body."

I need not follow his description further, as it differs so little from the practice of the present day, except that we no longer recognise definite notes as inseparable from certain regions, but rather express ourselves in comparative terms.

So paradoxical is life, that at a time when the eyes of the political world were turned towards France, looking with amazement at the fierce glow of the French Revolution, trembling under the terror of the all-conquering march of Napoleon, and finally watching his overthrow, there were researches being made in that very vortex of political unrest which will dominate clinical medicine so long as that science exists.

In a small town in Lower Brittany, the son of an advocate was born in 1781, Réné Théophile Hyacinthe Laennec, who, at an early age, was put under the care of his uncle, a doctor at Nantes. After his schooling, he became the pupil of his uncle, at that time senior physician at the hospital, and ultimately became Professor of Medicine and Materia Medica. Under this influence he commenced his medical studies, and early showed a predilection for morbid anatomy and clinical observation.

In 1799 we find him assistant-surgeon in a military hospital, and then with the Army of the West on active service. He soon resigned his post to complete his medical studies. He immediately attached himself to La Charité, at that time under the direction of the celebrated Corvisart. I need not follow his history in detail, but some idea of his tutelage may be gleaned from the fact that in the first three years at hospital he had recorded the minute history of four hundred cases of disease. In 1802, at the age of 21, he commenced publishing a series of articles of singular merit in the *Journal de Medicine.* At this time he was also the recipient of two much coveted prizes for original work from the Institute of France.

He contributed articles of some excellence dealing critically with the writings of Benjamin Bell and others. Perhaps the most striking writing of this period is the publication of his letter on the "Tunics which surround certain Viscera," addressed to the great Duypuytren, in which he displayed his profound anatomical knowledge, just as his other writings had shown his deep and intimate knowledge of pathological processes. In 1804 he took his degree of Doctor of Medicine. His health was not equal to the task he had set himself, and two years later he discontinued a series of lectures he had been giving in pathological anatomy.

I must pass over the brilliant record of the next ten years. It is perhaps deserving of mention that in 1814 he volunteered for service in the, at that time, military hospital of La Salpétrière, and we may incidentally note that his knowledge of Armorican led to his wards being crowded with his invalided countrymen from amongst the soldiery. In 1816 he became chief physician at the Necker Hospital, with which his name is so intimately associated.

It was just at this time that he made his great discovery. His account of it is so simple, and at the same time so graphic, that I make no apology for giving you a literal translation of it, which runs as follows:—

"In 1816 I was consulted by a young woman labouring under the general symptoms of diseased heart, in whose case percussion and the application of the hand were of little avail on account of the great degree of fatness. The other method, that is the direct application of the ear to the chest, being inadmissible by the age and sex of the patient, I happened to recollect a simple and well-known fact in acoustics, and fancied at the same time that it might be turned to some use on the present occasion.

"The fact I allude to is the augmented impression of sound, when conveyed through certain solid mediæ, as when we hear the scratch of a pin at one end of a piece of wood when applying our ear to the other. Immediately on this suggestion, I rolled a quire of paper into a kind of cylinder, and applied one end of it to the region of the heart and the other to my ear, and was not a little surprised and pleased to find that I could thereby perceive the action of the heart in a manner much more clear and distinct than I had ever been able to do by the immediate application of the ear. From this moment I imagined the circumstance might furnish means for enabling us to ascertain the character not only of the action of the heart, but of every species of sound produced by the motion of all the thoracic viscera, and, consequently, for the exploration of the respiration, the voice, the rattle, and perhaps even the fluctuation of fluid extravasated in the pleura or pericardium. With this conviction, I forthwith commenced at the Necker Hospital a series of observations. The consequence is that I have been able to discover a set of new signs of diseases of the chest, for the most part certain, simple, and prominent, and calculated, perhaps, to render the diagnosis of the diseases of the lungs, heart, and pleura as decided and circumstantial, as the indications furnished the surgeons by the introduction of the finger or sound in the complaints wherein these are used."

Laennec now undertook the wonderful work of perfecting his new method of diagnosis; and with a degree of success, says his biographer, and a fertility of results much more remarkable than the discovery itself, and indicative of the finest powers of invention, the truest characteristic of genius. In June 1818, that is less than two years after the discovery, the author read a memoir before the Academy of Sciences, containing the outlines of his method; and in September of the following year he published the first edition of his work, entitled "Mediate Auscultation, or Treatise on Diagnosis of Diseases of the Lungs and Heart, based principally on the New Method of Investigation." This book is in two stout octavo volumes, and the enormous work required to compose it proved nearly fatal to its author. The book immediately received the attention of the medical world, but its author was obliged to seek a temporary oblivion in his native village in Brittany. His disorder was mainly nervous, and we find him, for the time, following hounds and pursuing a rustic life, which rapidly worked a charm on his exhausted frame. It was with considerable reluctance that he returned to Paris in 1821, to resume his work at the Necker Hospital. The year following he was appointed to the Chair of Medicine in the College of France. Although the Faculty of Medicine was shortly afterwards for some time suspended owing in part to the riotous behaviour of the students, we must look with great envy at the brilliant series of clinics which Laennec conducted at La Charité, and which attracted men from all parts of the civilised world to have the stethoscope demonstrated to them at first hand.

In passing, I may say that the treatise referred to above, the second edition of which appears on the shelves of our library, is a fascinating book, partly from the delightful diction, and partly because in reading it we seem to peep into the crucible of evolution whilst still the metal is molten, and see it poured into the mould and take shape that will persist. It is with wonder and veneration that we scan the first remarkable description of pulmonary respiration, puerile breathing, bronchial and cavernous respiration, pectoriloquism, broncophonism, and ægophonism, of the bronchial or tubary cough, the cavernous rattle and metallic tinkling. Then the adventitious accompaniments, where we first meet in this description moist crepitous rattle, mucous or gurgling rattle, and tracheal rattle, dry sonorous, dry sibilous, or hissing and crackling, also of the friction of ascent and descent.

With the revision of his work and the production of the second edition, Laennec's health finally broke down. This time it proved to be phthisis, and, in spite of a change to the country, the malady rapidly progressed, and at the early age of forty-six the end came.

Of the form of the stethoscope, it may be interesting to mention that the first instrument was made of three quires of paper tightly rolled and pasted together. It was not at first supposed that the central aperture was an essential feature. A series of experiments on all sorts of substances, from glass to gold-beater's skin, led to the adoption of a cylinder of wood, 1½ in. in diameter and 1 ft. in length, perforated longitudinally by a bore three lines wide, and hollowed into a funnel shape, to the depth of 1½ in. at one of its extremities. It is divided into two portions, partly for convenience of carriage, and partly to permit of its being used of half the usual length. The instrument in this form, says its inventor, is used in exploring the respiration and rattle; when applied to the exploration of the heart and voice, it is converted into a simple tube with thick sides, by inserting into its excavated extremity a stopper or plug traversed by a small aperture, and accurately adjusted to the excavation.

Such was Laennec's stethoscope, which he says must at all times be held in the manner of a pen, with the observer's hand close to the patient, so as to ensure the instrument is correctly applied.

In all his work Laennec does not forget the great discovery of Auenbrugger, and from the first recognised the extreme value of simultaneous auscultation and percussion.

It was Piorry, whose work followed so closely on that of Laennec, who fashioned the stethoscope into the stereotyped form used at the present time without any considerable modification.

We must now pass to other clinical accessories, and that which claims our attention in point of time is the sphygmograph. There has been a tendency in the past, which in our own day has reached very great proportions, to supplement the impression imparted by the patient's pulse to the physician's finger-tips by various graphic methods, so that a record may be made which is not dependent on the physician's memory for its accuracy, and which makes an observation eliminating the personal equation of the observer. In the matter of pulse tracings, the first serious effort which was crowned with any degree of success was the sphygmograph of Marey. This was followed by that of Dudgeon, and has led up to the various clinical devices of our own day, which make more elaborate observations, such as the polygraph of Mackenzie and the recently described instrument which has come from our own school, I mean the sphygmomanometer of Dr. Gibson.

It was in 1863 that Marey published his interesting researches on the "Circulation of the Blood." This book is a classic in physiology, and I only intend to mention that part of it which refers to the sphygmograph. His instrument gradually evolved from the older instrument the sphygmometer of Hérisson. This apparatus was constructed like a thermometer, with the bulb closed by a membrane, the mercury it contained is set in motion by the pulse beats. The only virtue of this instrument was that a tactile impression was replaced by a visual impression, which in no way was easier to analyse. The next great experimenter who essayed the task was the famous Ludwig, who placed a float on the mercury of the manometer; this was connected to a lever recording on a revolving drum. The instrument he called a kymograph. This was a great step in advance, although it was subsequently found that the oscillations set up in the mercury exaggerate the pulse wave.

Next followed Vierordt, who constructed the first sphygmo graph. This was a cumbersome arrangement of levers and counterpoises which made vertical lines on a cylinder, but the mass to be set in motion was so great that the resulting tracing reproduced none of the finer details of the pulse wave. Knowing the speed that the cylinder was travelling, the rate of the pulse might be calculated from its record.

At last, to remedy the inconvenience common to all the apparatus employed up till then, it was imperative to diminish enormously the mass to be moved, and to approximate as nearly as possible to the ideal lever, a rigid stem without weight which will very easily follow the impulses it receives, and be unable to modify them by its mass.

It seems almost an insult to enter into a description of Marey's sphygmograph, as it has a place in all our side-rooms. Suffice it to say that elastic pressure takes the place of the weights of the various earlier contrivances as a means of keeping the pad in contact with the pulse, that the levers are of thin wood and aluminium, and that the instrument has a recording card which moves in a direction parallel to the lever. In the originally described apparatus a pen recorded the pulse with ink, otherwise the instrument is unaltered, and the very informing series of pulse tracings then published have not so far as I know any superior.

The instrument of Dudgeon has the advantage of being somewhat more compact, and therefore more convenient for clinical work, but I doubt whether it has any advantage in the matter of accuracy.

In point of time the next important addition to the clinician's armamentarium was the aspirator. This was the invention of another Frenchman, and from the considerable portion of Dieulafoy's "Treatise on the Pneumatic Aspirator," which is devoted to defending his position as originator of it, the laurels must have been hotly contested at the time. The official birthday of his instrument was 2nd November 1869, and in the next three and a half years no less than seventeen were cited, by Dieulafoy, in his book.

In the days of Galen an instrument called a pyulcon was described, which was intended to draw off pus, but this and the other subsequent instruments, such as trocars and syringes, all worked either by gravity or by a subsequent vacuum, whilst the two main features of Dieulafoy's instrument were that his vacuum was previous, therefore relatively complete and under control, and that he only needed a fine needle. The boon his instrument was may be inferred from the following statements made before its appearance. Trousseau says, apropos of a pericardial effusion, "It is useless to try the different expedients which have been recommended to hasten the evacuation of fluids, the use of aspiratory pumps not being of any assistance, and complicating the instruments used in operating in a tiresome way."

There was a great vogue for the aspirator, and the list of conditions for which it was recommended includes the following:—Hydatid cysts, abscess of liver, retention of urine, removal of acute poisons from the stomach, ovarian cysts, hydrocephalus (infantile and fœtal), spina bifida, strangulated hernia, pericardial effusions, pleural effusions (purulent and otherwise), hydrarthrosis of the knee-joint, hydrocele, ascites, extravasated blood, chronic and metastatic abscesses, adenitis and suppurating buboes, as well as the part played by the aspirator in intestinal occlusion and in pneumotosis.

Now that the open operation has ceased to have any terrors for the surgeon, and the risks of sepsis and secondary hæmorrhage have so far dwindled, it is not surprising to find that the number of conditions for which the aspirator may be used with advantage is not so great as was described by Dieulafoy. Still it is an instrument which we could ill spare from the cupboard of the medical man's consulting room.

In looking round the side-room there are many things of which I should like to speak to you. But time does not permit. I would, however, ask you if you have ever considered who Heller was, or, again, what manner of men Nylander or Böttiger may have been, or if you have ever pierced the veil of apathy that surrounds the memory of that great chemist, Gmelin?

If these few disjointed remarks I have made stimulate your interest in the routine of clinical work, or if they serve to make you appreciate the enormous debt we owe to the investigators of the nineteenth century, I am satisfied and more than satisfied if they make you at all appreciate and realise how very outstanding were the researches of the great French school.

To feel the spirit of that time, those of us who have been able to while away a morning hour throughout a summer session, listening to the enchanting and truly educating lectures of the now Emeritus-Professor of Forensic Medicine, Sir Henry Duncan Littlejohn, can best appreciate.

Of those golden days in that proud capital, where Evolution and Revolution went hand in hand, one is reminded of the lines in the "Rubáiyát" of Omar Khayyám:

> "'Tis all a Chequer-board of Nights and Days
> Where Destiny with Men for Pieces plays:
> Hither and thither moves, and mates and slays,
> And one by one back into the Closet lays.
>
> The Ball no Question makes of Ayes and Noes,
> But Right or Left as strikes the Player goes;
> And He that toss'd Thee down into the Field,
> *He* knows about it all—He knows—He knows!
>
> The Moving Finger writes; and, having writ,
> Moves on: nor all thy Piety nor Wit
> Shall lure it back to cancel half a Line,
> Nor all thy Tears wash out a Word of it."

REVIEWS OF
BRITISH AND FOREIGN LITERATURE.

Manual of Bacteriology. By Robert Muir, M.D., F.R.C.P.Ed., Professor of Pathology, University of Glasgow; and James Ritchie, M.D., B.Sc., Superintendent, Research Laboratory, Royal College of Physicians, Edinburgh. Fourth Edition. Edinburgh and London: Young J. Pentland.

The many important advances in bacteriology during the five years which have elapsed since the appearance of the last edition of this Manual must have made the authors' task on the present occasion one of very considerable magnitude. They are to be congratulated on having incorporated much of importance, without greatly increasing the bulk of the printed matter, or sacrificing anything of value in the former edition. While the book does not possess the more minute detail necessary in a practical laboratory hand-book, it preserves, on the whole, its character as a reliable text-book for students of medicine. We have space to note only the more important additions.

In the departments treating of "Biological Methods," descriptions appear of Drigalski and Conradi's medium, of MacConkey's bile-salt media, and Petruschky's litmus-whey. Carroll's method for anaerobic cultivation is given, but we find no mention of Professor Hamilton's method of inoculating media under an air-excluding layer of oil.

The newer Romanowsky stains are described—Jenner's, Leishman's, Wright's, and Giemsa's—and their usual and special applications indicated. Levaditi's silver method for spirochætes in tissues is also given. With regard to the vexed question of Gram's method, the authors again recommend, as an alternative decoloriser, clove oil after dehydration with absolute alcohol. Surely this oil is now recognised to be much too strong for this purpose.

A. E. Wright's methods for counting cultures, his opsonic technique, and his vaccine methods, are all fully considered.

Gordon's fermentation tests are described, and their application in the differentiation of closely related organisms, particularly streptococci, indicated. "Epidemic Cerebro-Spinal Meningitis" receives more attention than formerly, as its increased importance merits. New descriptions are supplied of Ducrey's bacillus of soft chancre, and of the spirochætes found in syphilis and in the tick fevers. New facts relating to bovine and human tuberculosis are summarised, and large additions are made in the chapters dealing with para-typhoid fever, summer diarrhœa, dysentery, tetanus toxins, cholera (hæmolytic test), plague (relation of the rat flea to infection in man), and Malta fever, incorporating all the important discoveries made of recent years in connection with these diseases.

In the chapter on "Immunity," considerable alterations and modifications appear. This is not surprising in a subject which has attained to such complexity; and while, as might be expected, much in this chapter is beyond the grasp of the average student, nevertheless the chapter will prove valuable to the more senior student and graduate, as it presents a very complete picture of the present position of the problem, or rather group of problems, of immunity, displayed in as clear a manner as is possible at the present time.

A new chapter in the Appendix deals with "Trypanosomiasis, Kala-Azar, and Piroplasmosis."

Our review has necessarily been short, but enough has been said to show that this Manual should easily retain its place as one of the best of its kind in the English language for the student of medicine.

Surgery, its Principles and Practice. By various Authors. Edited by W. W. Keen. Vols. I. and II. Philadelphia and London: W. B. Saunders Co.

The reduplication of large "Systems of Surgery," while it may affect the commercial interests of publishers, offers no ground for complaint on the part of the reading members of the profession; they merely look to the acquisition of the best work on the subject, and, so long as a new system is better than the existing ones, it will quickly attain its proper place in surgical literature. Judging by the first volume of the "System" edited by the greatly renowned and ever popular Professor of Surgery in the Jefferson Medical College, Philadelphia, a higher standard of excellence has been attained in this than in any other with which we are acquainted. It is to be issued in five volumes.

In matters of print and illustrations it is unsurpassed; in the list of contributors we find the names not only of many of the best known surgeons of the United States and Canada, but also those of Bland Sutton, Moynihan. Owen, and Mayo Robson, in this country, of Lennander of Upsala and Albert Kocher of Berne.

The first article of the present volume is entitled "A Narrative of Surgery or Historical Sketch," and is by Dr. Mumford of Boston; in the form of short biographies of the great surgeons of the past, he writes in the most attractive style, and incites the enthusiasm and capacity for hero-worship on the part of the reader in a fashion that is unfortunately but too rare in medical literature; we should like to see it bound separately and placed in the hands of every student of medicine.

"Surgical Physiology" is the somewhat novel title of the chapter written by Crile of Cleveland; he deals, in a manner which is both scientific and instructive, with the physiology of the circulation, the respiration, the muscular system, the blood pressure, and the bearings of these in operative surgery.

The "Examination of the Blood" is by the younger Da Costa, and "Infection and Immunity" by Hektoen of Chicago. The chapter on "Inflammation" is by Adami, and is written on the same lines as his article in Allbutt's "System of Medicine"; he accepts Burdon Sanderson's definition of inflammation as the series of local changes which constitute the reaction to injury to, or irritation of, a part, and he is very definite on the impossibility of drawing any sharp border-line between inflammation and repair, because the two merge insensibly the one into the other.

Freeman of Denver writes on "Suppuration, Abscess, and Fistula," and on "Ulceration and Ulcers" and on "Gangrene." "The Process of Repair" is dealt with by Carter Wood of New York, and is a very complete exposition of the subject, with an extensive bibliography. Frazier of Philadelphia writes on "Thrombosis and Embolism," on "Erysipelas," "Tetanus," "Anthrax," "Glanders," "Actinomycosis," "Malignant Œdema," "Hydrophobia," and allied subjects. Smith of Buffalo writes on "The Traumatic Fevers," which term is made to include septicæmia and pyæmia. Nicholls of Boston writes on "Rickets" and Da Costa on "Surgical Tuberculosis." "Syphilis" is by Edwin Morton of Philadelphia, and is a very complete article, with a large number of successful illustrations. The article on "Tumours" is by Bland Sutton, who is now so well known as an authority on this subject; most of the familiar illustrations from his work are reproduced. The chapter on "Wounds and Contusions" is by Crile of Cleveland. The volume concludes with a well-planned index.

The second volume of Keen's "Surgery" exhibits the same excellence in equipment as its predecessor, but we are unable to say that the text maintains the same high standard; while there are several articles of great merit, there are others which present the merest summary of the subject in hand, and there are headings for which one searches the index in vain. The first chapter is on "The Diseases of Bone," and is by Dr. Nichols of Boston. It has many excellences, including some admirable descriptions of the pathological changes in bone, but in its clinical aspects it is too concise; surely the attempt to describe Brodie's abscess in half a dozen lines is carrying brevity a little too far. Eisendrath of Chicago, who is well known as the author of a work on "Surgical Diagnosis," gives in a little over a hundred pages a really good account of the commoner injuries of bone, the text being illumined by a large number of ordinary and X-ray photographs. Like the majority of writers in the "System," he rarely quotes from English authorities, and the practical little book written some years ago by Wharton Hood does not appear to have come under his notice. The "Surgery of the Joints" is the combined work of Nichols and Lovett, both of Boston; the former being responsible for the pathology and the latter for the clinical part. Binnie of Kansas has an excellent article on the "Muscles, Tendons, and Bursæ." It is written with the same terseness and economy of words which characterises his deservedly popular book on "Operative Surgery." The article on "Orthopedic Surgery" is in the very capable hands of Lovett, who ranks very high as an authority on this difficult subject. It is concisely written, but is eminently practical and most usefully illustrated. The chapter on "Surgical Lesions of the Central Nervous System," by Spiller of Philadelphia, is a valuable contribution to the subject, but it is left to the reader to imagine whether he or the editor is responsible for the limitation of the lesions to hæmorrhage, abscesses of the brain, cerebellar tumours, epilepsy, and tic douleureux, with some short notes on tumours of the spinal cord and of nerves. There is no mention of meningitis.

Of the remaining articles, mention should be made of that by Da

Costa of Philadelphia on "Surgery among the Insane," for it is as original in its conception as it is interesting.

Diseases of the Digestive System. Authorised Translation of "Die Deutsche Klinik," by Julius Salinger, M.D. (Modern Clinical Medicine, edited by Frank Billings, M.D.). London: Sidney Appleton.

The series of monographs of which "Die Deutsche Klinik" is composed was designed to be representative of German clinical medicine at the commencement of the twentieth century; the authors were selected from amongst the foremost German clinicians, and therefore the work is of more than ordinary interest, and well deserves being translated into English, as is being accomplished under the editorship of Dr. Billings in the "Modern Clinical Medicine" Series, of which the volume under review is an instalment. The list of contributors to it includes such well-known names as those of Ewald, Boas, Vierordt, and Nothnagel, along with those of others who, although of less celebrity, have also distinguished themselves by original work in this branch of medicine. The book consists of a series of elaborated clinical lectures on different aspects of diseases of the digestive organs, rather than a systematic treatise, and most of the writers have kept practical questions well to the front, and laid great stress on differential diagnosis and treatment. Among the best chapters are those of Leo, Strauss, Riegel, Ewald, and Boas on the diagnosis of secretory disturbances, functional disorders of the stomach, gastrectasis, gastric ulcer, and carcinoma, which are one and all discussed with a fulness commensurate with their importance. All the writers attach a great deal of weight to, and rely greatly on, chemical tests of the stomach secretions in diagnosis, and they give definite rules as regards methods which are practically useful, and do not perplex the reader with a choice of alternatives. Strauss's article on secretory disturbances of the stomach is particularly satisfactory in these respects. Pancreatic diseases are discussed by Oser, who, however, might have given more credit than he has done to the work of American and British physicians—Opie's name is scarcely mentioned, and Cammidge's observations are not noticed. Minkowski is responsible for a very clear account of jaundice, in which the modern view that there is no hard-and-fast distinction between light and severe forms of jaundice is explained. There is no doubt that apparently simple catarrhal jaundice may go on to icterus gravis and acute yellow atrophy. If this makes the prognosis in simple jaundice somewhat less favourable, it shows, on the other hand, that recovery may be possible even in very grave cases. The papers on appendicitis by Vierordt and Boas are full of interest, and the pros and cons of operation in different types of case are thoughtfully stated. It is, indeed, a feature of all the lectures, that treatment is discussed from the surgical as well as the medical standpoint. There is a short, but useful, article on the examination of the fæces, especially by Schmidt's diet, by Strasburger. The volume concludes by a lecture on intestinal obstruction from the pen of the late Professor Nothnagel. The translation is clear, though not always elegant, and the editorial notes, which are judiciously limited, enhance the value of the book, which will be found a useful and practical guide to the diagnosis and treatment of digestive disorders.

The British Pharmaceutical Codex: An Imperial Dispensatory for the use of Medical Practitioners and Pharmacists. Published by the Pharmaceutical Society, London.

In some respects this is one of the most important contributions to recent medical literature. It may be considered as a greatly expanded pharmacopœia. It differs from official pharmacopœias in several respects. Most pharmacopœias deal only with established drugs. Medicinal substances which are still, as it were, on their trial are not included. Only well-known and thoroughly tested drugs are included. As a rule, the average practitioner cares little for such official compilations, as he knows more or less all that he requires to know about such drugs. It is the newer preparations, which are not so well known to him, that he is in doubt about. Now, the "Codex" attempts to meet his requirements in this respect. It professes to include all drugs and medicinal substances which are in common use. The drugs are described on much the same plan as that adopted by the B.P.; but there is this important difference, that short descriptions of the pharmacological and therapeutical actions are given in addition. This portion of the work has been allotted to Dr. W. E. Dixon, who has achieved a very large measure of success in giving condensed notices about these points. The "Codex" as a whole is compiled by a small committee of the British Pharmaceutical Society. They have adopted various special features in their general arrangement. Thus the galenical preparations are so arranged that the quantities given make up 100 parts of the preparation for either metric or imperial weights, while the plan has the further advantage of enabling the medical man to see at a glance the percentage composition of the preparation. The doses are given both in imperial and metric scales. To minimise the risk of error with the latter scale, the use of the terms mils, decimils, and centrimils has been introduced to represent fractions of the litre. The formulæ given in the book are very numerous. It is stated that many are original, while others represent preparations which are in large demand under proprietary names. This fact makes the "Codex" of great importance to medical men. In many cases, by consulting the "Codex" they can find the chemical designation of the proprietary drug, and are thus rendered independent of the manufacturer, who in recent years has rammed therapeutics down the throats of the medical profession by the crude patter of ill-educated travellers. By using the "Codex," the practitioner, in many cases, will find that the vaunted new drug is really an old familiar friend in a new name and not likely to possess any superiority over the other form. The use of the "Codex" will, to a large extent, free the profession from the domination of the manufacturing chemist. Despite the fact that it is by no means perfect (it contains far too many misprints and errors in dosage), we are sure that the "Codex" will be found of great use by the medical profession. It is far more useful than the British Pharmacopœia, and the sale of the B.P. is likely to be seriously curtailed by the new compilation.

NOTES ON BOOKS.

LITTLE remains to be said about *A Surgical Handbook*, by F. M. Caird, F.R.C.S.Ed., and C. W. Cathcart, F.R.C.S.Ed. (C. Griffin & Co., London). In Edinburgh, at least, it is deservedly on the shelf of every house-surgeon, and in the pockets of most students when they begin their surgical ward work. There are only two points to which one would like to direct attention. In fig. 116 the wooden splint *with footpiece*, used in fractures of the leg, is represented on the inner side of the leg, instead of, in accordance with the correct description in the text, on the outer. In fractures of the upper arm, the authors advise bandaging of the forearm and hand, to prevent œdema. A very large number of surgeons are strongly opposed to this, regarding it as an ostrich-like policy of burying one's head in the sand, in order to avoid seeing a sign which is a valuable indication that the apparatus above is too tightly applied. We think, therefore, that some note of this fact should be made in the book, even if the bandaging method is advised. As the previous edition was issued last year, this, the fourteenth, has required practically no change. It is only necessary to say that it maintains the character which has made "Caird and Cathcart" a household term in surgical circles.

In *Cancer*, by G. Sherman Bigg, F.R.C.S.E. (Baillière, Tindall, & Cox, London), the assertion is that "the origin of cancer is a primary condition of congestion in an individual whose constitutional vitality is impaired." Cancer is at first "benign," and only becomes malignant because of an impaired constitutional condition. Therefore "an operation, when the stage of malignancy is reached, should not be hastily undertaken, . . . but should be postponed till the general health has improved." Without constitutional treatment, "recurrence after removal is the invariable, and, it may be added, the inevitable, result." Operations, if undertaken, should not be extensive, as "operation does not touch the constitutional disorder." The better results of early operations are due to the fact that in these cases operation is unnecessary. That long-continued irritation appears to furnish a starting-point for cancer, will be admitted by most people, but that there are any logical grounds for the author's conclusions is a very different matter. In our present knowledge of malignant disease, we are hardly justified in denouncing any theory as absurd. He *may* be correct.

Another little book on the same subject, but written from a very different standpoint, is *The Reduction of Cancer*, by the Hon. Rollo Russell (Longmans, Green, & Co., London). His view is that valuable information concerning the causation of a disease is obtained by a study of statistics regarding the prevalence of the disease in various countries, a comparison of the results with the food habits and other conditions of these nations, and an investigation as to whether there is any similarity in the conditions of those countries possessing a high disease-rate, on the one hand, and those possessing a low disease-rate, on the other. He applies this method to the cancer problem, and comes to the conclusion that susceptibility to cancer is based on an excessive use of one or more of the following: flesh, tea, coffee, beer, tobacco, spirits. Of course, no argument on these lines can amount to anything like a conclusive demonstration—there are too many other possible factors in the case—but these facts must certainly be kept in mind, and they are here carefully and temperately stated.

There should be a place for such a book as *Consumption: Home Treatment and Rules for Living*, by H. Warren Crowe, M.D. (Wright & Co., Bristol), of which the second edition is now published. In his Introduction, addressed to the medical profession, the author says that doubtless most practitioners have, like himself, experienced "the difficulty of finding time to drill into their consumptive patients all the minute details of their treatment," when the patient cannot afford a few months of sanatorium life. This book is intended for the patient's study, in order to get over this difficulty. The details of the patient's life, the value of rest, open air, and food, and the indications for increasing the amount of exercise, are given. The book is short, clearly written, without technical detail, but with an explanation of the reasons underlying every rule, and is provided with blank leaves at the end for special instructions by the medical man according to the nature of the individual case. The book can be heartily recommended.

Among the "Alembic Club Reprints," the seventeenth consists in a translation of the *Medico-Physical Works of John Mayow, LL.D., M.D. (1674)* (J. Thin, Edinburgh). John Mayow flourished in the middle of the seventeenth century, and very little is known regarding him. At the age of twenty-five he published two treatises, "On Respiration," and "On Rickets"; and six years later three others, namely, "On Sal-nitrum and Nitro-aërial Spirit," "On the Respiration of the Fœtus in the Uterus and in the Egg," and "On Muscular Motion." He died at the early age of thirty-six, and his works fell into oblivion, until a century later, when they were rediscovered, and regarded as anticipating more recent chemical discoveries. The five treatises, originally written in Latin, are translated in the book before us, and are interesting examples of the arguments and speculations of a scientific medical man who lived nearly two hundred and fifty years ago.

Diaries and Calendars are a necessity for all, and especially for members of the medical profession, and we can thoroughly recommend those published by John Walker & Co. Ltd. A great deal of thought and care has evidently been bestowed by this firm upon the production of varieties to suit every taste and requirement. There are desk calendars in every form of frame, as well as the useful daily "tear off" blocks and calendar writing tablets, while we know no better diaries for good and artistic workmanship at a moderate price.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

J. S. FOWLER, M.D., F.R.C.P.Ed.,
PHYSICIAN, ROYAL HOSPITAL FOR SICK CHILDREN.

DISEASES OF THE STOMACH.

ACUTE DILATATION OF THE STOMACH AND ITS RELATION TO MESENTERIC OBSTRUCTION OF THE DUODENUM.—In a study of the rare condition of acute dilatation of the stomach, Conner (*Am. Journ. Med. Sc.*, Phila., 1907, March) has analysed 102 cases of the disease. The clinical picture it presents is definite, and the diagnosis not difficult if the possibility of the disease be kept in mind. Its early recognition will lead to the successful treatment of many cases which would otherwise prove fatal. Although acute dilatation of the stomach rests on no one pathological basis, the most important single cause of the condition is sudden incarceration of the lower end of the duodenum between the root of the mesentery, which passes in front of it, and the vertebral column, which lies behind. Conner reports the following example of the affection:—A patient was admitted to hospital suffering from acute miliary tuberculosis. One morning at 9.30 A.M. he suddenly complained of severe abdominal pain, and was found to have a marked distension of the left side of the abdomen, particularly above the umbilicus. The lower border of the circumscribed prominence could be made out just below the level of the umbilicus. The note was tympanitic, and there was much tenderness over the prominence. There was no vomiting. The patient died three hours later. On post-mortem examination, in addition to miliary and caseating tuberculosis, an enormously distended stomach was found. The greater curvature reached to within 2 in. of the symphysis, and the distance from the fundus to the lowest part of the stomach was 12 in. The duodenum was 2½ in. in diameter, and tensely distended up to the point at which the mesentery crosses it; below this the gut was collapsed. Owing to catarrh, œdema, and absence of gas, the small intestine was heavy, and as it hung down into the pelvis it dragged on the mesentery and compressed the duodenum. A finger introduced into the duodenum encountered an obstruction, which was removed by raising the intestine and mesentery. The case is typical in many respects, but is peculiar in (1) absence of vomiting, and (2) the shortness of its duration. From an analysis of the records of 102 cases, Conner is able to depict the chief features of the disease.

Etiology.—Three-quarters of the cases occur between the 10th and

30th years; males and females are almost equally liable. From a study of the health of the patients at the time of onset, it is found possible to recognise several more or less well-defined groups of circumstances favouring the occurrence of acute dilatation:—(1) Those in which dilatation followed operations under general anæsthetics (41 per cent. of all cases). The operations were by no means always on abdominal viscera. The symptoms may arise soon after recovery from the anæsthetic, or be delayed for several days. (2) Cases occurring in the course of wasting diseases, or during convalescence from acute illness. (3) Cases developing after injury, especially to the spine and head. (4) Cases ascribed to an error of diet,—unusually large meals or drinking large quantities of fluid, especially cold liquids. (5) Cases associated with disease or deformity of the spine. Six of the last are recorded, and on three occasions the symptoms came on while the patient was being enveloped in a plaster of Paris jacket. (6) In a few instances acute dilatation has occurred in the midst of perfect health.

Symptoms.—*Vomiting* is one of the most constant (91 per cent.), and persists as a rule throughout the illness. The ejecta are abundant, often bilious, seldom feculent. *Pain* is usually intense; *tenderness* is less marked. *Distension of the abdomen* is almost always found; it may be general, epigastric, or below the umbilicus. *Constipation*, sometimes amounting to obstruction, is common. *Splashing sounds* below the level of the umbilicus have helped the diagnosis on several occasions. *Visible peristalsis* is rare, being mentioned only thrice. Further symptoms are thirst, subnormal temperature, hiccough, and collapse. The mortality is high—72·3 per cent. of the reported cases; death occurs in from a few hours to several days. The morbid anatomy and mechanism of the condition are of great interest in relation to its effective treatment. There is always extreme dilatation of the stomach, which usually fills the whole abdomen. In about two-thirds of the cases the duodenum shares in the distension. In a large number of instances the duodenum has been found compressed by the root of the mesentery.

Mechanism of acute dilatation.—The following views have been expressed:—(1) Primary paralysis, as from a lesion of the trunk of the vagus, *e.g.*, in pneumonia with exudation into the posterior mediastinum, or from direct injury to the terminal fibres in the stomach. (2) Neuroparesis with pyloric spasm. This seems improbable, looking to the frequency of bilious vomiting. (3) Mechanical obstruction. This is probably the most common and important form. Kelling experimented in this direction. He assumed that in order to cause acute dilatation there must be obstruction at the cardia as well as at the pylorus. He found that on inflating the stomachs of cadavera the cardiac opening was in many cases impervious, owing to its valvular character, and could only be opened from below by active muscular contraction. Weakening of the stomach wall would render this difficult or impossible. He further found that when the œsophagus was ligatured, kinking of the duodenum was apt to follow distension of the stomach. Conner cannot confirm these experiments, and points out that the occurrence of vomiting precludes the existence of valvular closure of the cardia. He ascribes the condition to mesenteric obstruction. Normally, the terminal part of the duodenum is slightly flattened between the mesentery and the vertebral column, and if traction is made on the small intestine downwards and backwards in the direction of the pelvis, occlusion of the gut takes place. The essential conditions for the production of acute dilatation, therefore, are such as (1) favour compression of the duodenum, and (2) aid descent of the small intestine into the pelvis. In order that (2) may be possible, there must be *dorsal decubitus, empty intestines,* and a *long mesentery.* The duodenum is rendered more liable to compression by lordosis of the lumbar vertebræ. It normally crosses the level of the third lumbar, and as the fourth lumbar is the most prominent, a duodenum which is lower than normal is more exposed to compression.

Treatment.—In order to be effective, treatment must be prompt. Empty the stomach by lavage several times in the twenty-four hours, and interdict all food by the mouth. Place the patient in the genupectoral position, and keep him in that attitude for several hours, in order to remove traction from the mesentery. These measures have proved efficacious in a number of cases. Operation has only once been successful; a kink of the duodenum was found and untwisted.

Gastric Achylia.—The term "achylia gastrica" was invented by Einhorn to designate a condition of the stomach in which the gastric juice is abolished, either with or without atrophy of the glandular apparatus. In a long paper Liefschutz (*Arch. f. Verdauungs.*, Berlin, 1906, Bd. xii. S. 429) discusses the nosological position of the disorder, its diagnosis, and its relationship to the composition of the gastric juice in advanced life. Some writers include under the rubric "achylia" cases in which only hydrochloric acid is deficient; others limit it to those in which both enzymes and acid are absent. We are not as yet able to say whether there is any parallelism between anacidity and deficiency of pepsin. Since Einhorn's paper appeared, achylia gastrica has generally been treated of as an independent clinical entity, and Liefschutz's main contention is that it is not—that it is merely symptomatic, and that therefore, in treating it, it is necessary to find out the cause in any case. It is, of course, well known that anacidity (achylia) is common in gastric carcinoma; these cases we may exclude from further consideration. The diagnosis of achylia, according to Einhorn, rests chiefly on an examination of the gastric contents:—(1) In the fasting condition the stomach is quite empty. (2) After Ewald's test, breakfast only a little undigested bread can be withdrawn [*i.e.* there is no stagnation]. (3) Neutral or very faintly acid gastric contents. (4) Pepsin completely, or almost completely, absent. (5) No gastric mucus after Ewald's test breakfast. (6) The mucous membrane is vulnerable: passing a tube easily causes slight hæmorrhage or abrasion of the mucosa and the removal of small fragments. The clinical symptoms are variable. There may be no digestive disorder; there may be ordinary dyspeptic symptoms, or there may be pain simulating that of hyperchlorhydria. The most striking feature is lienteric or ordinary diarrhœa, which occurs in one-third of the cases. This is associated with the escape into the bowel of undigested connective tissue, and its passage in the stools. It is further favoured by the entry of undigested food into the intestine, and by the absence of the normal disinfecting action of the gastric hydrochloric acid. The stools, therefore, are loose, contain quantities of connective tissue, and are often decomposed. Liefschutz has made exact observations on sixty patients between 50 and 75 years, and found achylia in twenty-five of them. Five of the cases had gastric carcinoma, which leaves twenty, or just a third of the whole, with simple achylia. In five of the twenty there were no digestive disturbances of any kind. In the others some of the above were present. All the patients suffered from some other disease—malaria, cirrhosis of the liver, alcolohism, etc. Liefschutz concludes that the gastric juice tends to diminish after the age of 50, and that complete absence of hydrochloric acid is not rare in old people. Achylia gastrica does not merit recognition as a separate disorder; it depends on some other disease, and its curability depends on the possibility of discovery and curing its cause.

Einhorn's Method of Testing the Digestive Functions.—During the past year or so, Einhorn has published a series of papers dealing with the investigation of the digestive processes by an ingenious method he has devised (*Arch. f. Verdauungs.*, Berlin, 1906, Bd. xii. S. 26). He attaches to coloured glass beads small portions of various food elements, and encloses several of these in a gelatin capsule. This is swallowed, and by recovering the beads from the motions, the amount of digestion each food has undergone can be recognised. The following beads are used:—(1) *Catgut.*—A strand of catgut is knotted through the bead. Catgut consists chiefly of connective tissue, which is digested in the stomach only, not in the intestine. If the beads when passed still have the catgut attached, the gastric secretion is at fault—achylia gastrica. It may occasionally happen that the catgut is digested in the intestine, which diminishes the negative value of the test, accordingly a (2) *fish-bone* bead is employed. A thin fish-bone is threaded through the bead, and fastened with catgut. This is digested in the stomach, not in the intestine. A positive result—disappearance of the fish-bone—shows that the gastric function is active. To test the functions of the whole alimentary tract, a capsule containing, in addition to these, four other beads, is employed. The whole comprises—(1) A white bead, catgut; (2) green bead, fish-bone; (3) red bead, fibre of raw beef; (4) yellow bead, with a piece of potato and its skin which has been boiled for two minutes attached to it; (5) violet bead, covered with mutton fat; (6) blue bead, with a scrap of thymus wrapped up in gauze. The beads are small, and go into an ordinary capsule, which is given half an hour after a meal. The significance of the first two beads has been mentioned; (3), (4), and (5) afford information as to the digestion of proteid, starches, and fats respectively; the thymus bead is designed to test the activity of the pancreas. When gastric, intestinal, and pancreatic digestion are alike active, the thymus is completely dissolved; if the intestinal and pancreatic juices are defective, it is not digested; while if the stomach and intestine are defective and the pancreas active, part of the gland is preserved, but the nuclei are destroyed. In a further communication (*ibid.*, 1907, Bd. xiii. S. 476), Einhorn gives a number of illustrative cases. The chief difficulty seems to be to find a reliable test for gastric insufficiency—a substance which is digestible in the stomach, and the stomach only. The value of the thymus test, however, is confirmed; only the pancreatic juice, it would seem, can dissolve nuclear tissue.

New Tests for "Occult Blood" in the Fæces.—Two recent papers deal with these (Davis, *Boston Med. and Surg. Journ.*, 1907, August 8; and Goodman, *Am. Journ. Med. Sc.*, Phila., 1907, October). Both writers have studied the various tests comparatively, and agree that the benzedin reaction is by far the most delicate, being about ten times as sensitive as guaiac, and giving a reaction with solutions of blood so dilute as 1 to 200,000. They both agree also as to the best way of performing the test; no deviations from the following routine are permissible. Add a knife pointful of benzedin purissimum (Merck) to 2 c.c. glacial acetic acid, to make a saturated solution. A piece of fæces, the size of a pea, is stirred up in a test tubeful of water and boiled to destroy ferments, which interfere with the test. Mix 10 drops of the benzedin solution with 2 to 3 c.c. commercial 3 per cent. hydrogen peroxide, and to this add a few drops of fæcal infusion. Blood is indicated by a deep greenish-blue colour. The test is so delicate that the patient's diet should be meat-free for three days before the fæces are examined; the giving of drugs, especially iron, should also be interrupted during the same period.

SURGERY.

UNDER THE CHARGE OF

ALEXANDER MILES, M.D., F.R.C.S.Ed.,

LECTURER ON SURGERY, SCHOOL OF MEDICINE, EDINBURGH.

The Röntgen Rays in relation to Malignant Tumours.

I. The Rays in the Treatment of Cancer.—At the Twentieth Congress of the French Association of Surgeons, held at Paris in October of this year, one of the subjects set down for discussion was "The Influence of the Röntgen Rays on Malignant Tumours" (*Gaz. d. hôp.*, Paris, 1907, October 8 and 12). In his report on the subject, Béclère drew attention to certain *physical laws* which seem to govern the action of the Röntgen rays on the tissues. All the rays passing from a point exert an action on the tissue, which is in inverse ratio to the square of the distance between the focus of emission and the receiving surface. The further the receiving tissue is from the tube, therefore, the smaller is the "quantity" of the rays reaching it. Thus it follows that the skin receives a greater proportion of the rays than the subcutaneous tissues. Not only so, but the tissues through which the rays pass absorb a certain proportion of them, so that the amount which reaches the deeper places is very much less than that reaching the surface. From the point of view of the effect of the rays on tumours, it is the quantity absorbed that is the important factor; for it is it which modifies the chemical composition of the cells, disturbs their nutrition, arrests their multiplication, and induces their degeneration and death. It has been shown that prolonged exposure of the tissues to the rays induces changes in the nuclei and in the protoplasm of the cells, which ultimately lead to their destruction, and that this action is more marked on epithelial cells than on those of muscle, cartilage, or connective tissue. The rays also exert a profound influence on the white corpuscles of the hæmopoietic organs—a fact of some importance in relation to their effect on malignant growths. The effect of the rays appears to be to produce a tumefaction of the tumour cells, with fragmentation of the nuclear chromatine, and necrosis of the protoplasm. To this stage of cytolysis there succeeds a stage of phagocytosis by the polynuclear leucocytes. These changes begin at the periphery of the growth, and gradually extend to the deeper parts. To ensure a complete cure, it is necessary to continue the exposures for a long time after the apparent disappearance of a tumour.

Great care is necessary in adjusting the "dosage" in the use of the rays. If they are used in excess, either by giving too long exposures, by giving them too often, or by prolonging the treatment unnecessarily, radio-dermatitis is set up, and is attended with pain, ulceration, and even gangrene of the skin. The cells of new growths are more susceptible to the action of the rays than the normal cells of adjacent tissues, and the pathological cells of different tumours appear to have different degrees of sensibility.

In ulcerating *malignant tumours of the skin*, Béclère finds that the rays exert a "levelling" action, "casting down the mountains and raising the valleys." When the epithelioma has not invaded the whole thickness of the skin, it is usually completely cured; when it has traversed the skin, a cure is effected in many cases, in others there is a temporary amelioration, and the progress of the disease is kept in check. The use of radiotherapy is a valuable adjuvant to operative treatment. In inoperable cases it is still the best palliative measure at our disposal. Tuffier, Imbert, Témoin, and Périere agree that in cutaneous epitheliomata the rays may effect a permanent cure, but have seen no favourable effect on tumours more deeply situated, and which are really malignant.

Malignant tumours of mucous surfaces, if they are superficially placed, for example on the lip, and of slow growth, may be cured by the rays; in the tongue and on the tonsils the good results have only been temporary (Béclère).

According to Béclère, all stages of *cancer of the breast* may be benefited by the rays. A tumour still confined to the mammary tissue, and in exceptional cases, even when the skin and the most superficial glands are implicated, if of slow growth, may disappear under the influence of the rays alone. After operation, the rays have been useful in arresting the progress of recurrences in the skin and in the more superficial glands, and in promoting cicatrisation of ulcerated areas; but they have had no effect on deeper invasions of the lymphatics, of the chest wall, or of secondary foci in deeper parts.

In cases of recurrence, in which further operative treatment is deemed inadvisable, it is the palliative measure of choice, as it grants a marked relief from suffering, improves the general condition, prolongs life, and sustains the patient's hope to the last. [In a recent case the abstractor has found the use of the rays most beneficial in these various directions.]

It is believed that exposure to the rays is calculated to prevent recurrence after operation.

With reference to cancer of the breast, Maunoury holds that if the tumour is mobile, with or without axillary glands, it should be freely removed, and the wound at once exposed to the rays, and then closed. If the cancer and the glands are more extensive, the wound should not be closed, but should be subjected to a course of radiotherapy. If the case is inoperable, or if operation is contra-indicated, the rays alone should be employed.

The majority of those who took part in the discussion agreed that the rays are only to be used as an accessory to operation, when there is reason to believe that all the disease has not been removed, or when there is evidence of recurrence which cannot be eradicated by the knife.

Sarcomata.—The cells of sarcomatous tumours are, speaking generally, more susceptible to the action of the X-rays than epitheliomatous cells. It is claimed that intracranial sarcomatous nodules, secondary sarcomata in the abdominal wall, and mediastinal sarcomata have disappeared under the influence of the rays. Maunoury considers that recurrences in cases of sarcoma are favourably influenced by the rays. He also advises the use of the rays after operation, with a view to preventing recurrence.

Affections of the lymphatic glands are peculiarly amenable to treatment by the X-rays, doubtless on account of the sensibility of the white corpuscles of hæmopoietic organs, especially the lymphocytes. In this connection, Willems points out that the rays vary in their effects on glandular affections: simple hyperplasia disappears entirely; tuberculous enlargements are slowly influenced; true tumours are not affected at all.

Enlargements of the spleen are often profoundly affected by radiotherapy, but the improvement, as a rule, is only temporary.

Malignant tumours of the viscera.—It would appear that the X-rays have given some successes in the treatment of malignant tumours of the larynx; but, in the absence of histological evidence, it is difficult to assess their value. In cancer of the stomach, the only certain effect has been the disappearance of pain. Maunoury says that in visceral cancer there is little or no benefit derived.

Lardennois lays emphasis on the fact that certain epitheliomata are aggravated by the rays, and Doyen says that the method is not only useless, but dangerous, as the rays destroy the leucocytes, and so prevent phagocytosis, which is the natural protection of the organism against the cells of the new growth.

II. THE RAYS AS A CAUSE OF CANCER.—A striking commentary on the above is furnished by the paper by Charles A. Porter and Charles J. White of Boston, on "Multiple Carcinomata following Chronic X-Ray Dermatitis" (*Ann. Surg.*, Phila., 1907, November). These observers report with great detail, including a very complete histological investigation, the particulars of a case of dermatitis of the fingers and hands, due to repeated and prolonged exposures in an X-ray operator. The dermatitis began in 1896, and proved intractable to all forms of treatment. The following year ulceration began, and in the ulcers which formed epitheliomata developed, necessitating amputation of several fingers. The authors have collected particulars of eleven cases of undoubted X-ray cancer, excluding cases of lupus treated by the rays in which carcinoma has subsequently developed. Of these, five have proved fatal by extension to glands and by metastasis. The usual history has been one of an X-ray operator, exposed to the rays for some hours each day, developing a degree of dermatitis on the fingers and hands, but persisting at work in spite of the skin condition. Superficial ulcers, attended with excruciating pain, formed and healed very slowly, only to break down again and again, and finally to form chronic ulcers. In these ulcers carcinoma developed, leading in many cases to invasion of the axillary glands, and in some to visceral metastases, which proved fatal.

In the light of the recorded cases and of their own experience, the authors emphasise the great danger of all persistent X-ray ulcerations. They sum up what is a very valuable contribution to the literature of the subject of X-ray dermatitis with the following conclusions:—(1) For the atrophic condition of the skin and the telangiectases nothing can be done. (2) Hypertrophic changes, keratoses, and warts may with safety be treated in the usual manner. If such treatment fails, excision, with or without skin grafting, will probably relieve the pain, and result in a cure. (3) Excision and grafting will prove to be the best treatment for recurrent fissures. (4) All ulcerations which, under ordinary treatment, remain open after three months, should be thoroughly excised and very carefully examined. The subsequent treatment, depending on the result of the microscopic examination, should be skin grafting, further excision and grafting, or amputation. (5) As the history of almost all these cases dates back to early exposures, before precautions were taken to protect the skin of the operators, it is hoped that the number of cases will soon diminish. (6) Meanwhile all persistent X-ray ulcerations should be excised early, in order that malignant degeneration may be prevented.

It is only fair to add that Béclère, while he acknowledges that malignant disease frequently supervenes in cases of dermatitis and ulceration due to the rays, does not admit that the rays are the direct cause of the epitheliomatous degeneration, any more, he says, than corrosive sublimate, producing a wound by cauterisation, can be said to be the cause of a septic infection which may ensue. Such an argument we confess, fails to convince us.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF
F. W. N. HAULTAIN, M.D., F.R.C.P.Ed.,
PHYSICIAN FOR DISEASES OF WOMEN, DEACONESS HOSPITAL, EDINBURGH;
AND
J. A. C. KYNOCH, M.B., F.R.C.P.Ed.,
PROFESSOR OF OBSTETRICS AND GYNÆCOLOGY, ST. ANDREWS UNIVERSITY.

Rupture of an Ovarian Cyst during Pregnancy.

Morestin (*Ann. de gynéc. et d'obst.*, Paris, 1907, October) reports the case of a woman, æt. 35, who was seized with violent abdominal pains during the fourth month of pregnancy. The abdomen was distended to a considerable degree before the onset of the pain, which recurred frequently, accompanied with severe attacks of vomiting. She was admitted to hospital manifesting all the signs of internal hæmorrhage. A tumour was found on the left side reaching above the level of the umbilicus, and the uterus was enlarged to the size of a 4-months' pregnancy. There was no hæmorrhagic discharge from the vagina. Abdominal section was performed, and the tumour was found to be a ruptured multilocular ovarian cyst, with twisted pedicle. On the second day after operation labour began, and a 4-months' macerated fœtus was expelled, the placenta being removed manually. The patient, although very weak from hæmorrhage, ultimately recovered.

Spontaneous Cure of a Uterine Fibroid.

E. J. Roberts (*Intercolon. Med. Journ. Austral.*, 1907, September 20) reports an unusual termination of a fibroid of the uterus. Patient, æt. 36, had a fibroid complicating pregnancy at the sixth month. Labour was induced, but the tumour was not interfered with. Two years later she noticed a swelling in the right iliac region, which became very painful. She treated this with frequent poultices, until at last suppuration of the abdominal wall occurred, and a fleshy mass protruded from the opening so formed. On examination, it was found that the mass was a calcified fibroid connected with the abdominal cavity by a slight band, which gave way on pulling the tumour. A skiagraph showed a considerable amount of calcareous matter lying at the bottom of the sinus, which was removed with a curette. The sinus subsequently showed every appearance of healing.

Two Cases of Puerperal Sepsis treated by Vaccines.

Lloyd (*Intercolon. Med. Journ. Austral.*, 1907, September 20) reports the following cases :—Case 1.—Patient, 1-para, æt. 18, was admitted to hospital with a temperature of 101° F., and pulse 110, membranes ruptured, os the size of a florin. The patient was delivered with forceps next day, and the placenta was removed manually, sterilised rubber gloves being used. Four hours later patient had a rigor; temperature 103°, pulse 168. On the third day cultures of uterine discharge showed streptococcus and staphylococcus. The uterus was plugged with iodoform gauze, and strychnine, iron, and alcohol given internally. Later the uterus was swabbed with 2 per cent. solution of formalin, and replugged. As the patient's condition did not improve, a vaccine was made, and an injection containing 100,000,000 cocci given on the sixth day, the blood examination at the same time showing a pure culture of *Staphylococcus albus.* Next day there was a leucocytosis of 21,800. All further local treatment was stopped. From this time progress was satisfactory, and the patient left the hospital well on the twenty-second day.

Case 2.—Patient, 1-para, æt. 19, admitted to hospital after being in labour twelve hours. The presentation was occipito-posterior, and delivery was effected by forceps. On the eighth day the temperature was 105° F., and pulse 136. Cultures showed streptococcus and staphylococcus, and blood examinations showed all three organisms to be present. From these vaccines were made and injections commenced of 25,000,000 streptococci and 250,000,000 staphylococci. Rigors continued at intervals for thirty days. Seven injections of vaccine were given at intervals of two days, increased to double the quantity at each injection. For ten days vaccines were withheld, to be repeated again as the temperature kept high. On the fortieth day of illness, 10 c.c. blood taken from the patient gave no cultures. The improvement was going on steadily when patient left hospital against advice.

The Treatment of Eclampsia.

Bumm (*Deutsche med. Wchnschr.*, Leipzig, 1907, November 21) points out that the treatment of eclampsia must still necessarily be symptomatic and empirical. He notes that eclampsia is more common in North than in South Germany. Whatever theories are suggested as being the cause of this condition, pregnancy is the all-essential one. Without pregnancy no eclampsia. Therefore Bumm regards the emptying of the uterus as the most important remedy. Although cases undoubtedly recover without labour being induced, yet postponing the latter may unfavourably affect the result. Since the actual onset of eclampsia is generally preceded by warning symptoms, those may be treated first, and if this fails to restore the kidney function, then Bumm strongly recommends the termination of pregnancy, when in the great majority of cases all symptoms disappear. By rapid delivery after the first fit, Bumm has had a mortality rate of only 2 per cent., as compared with 25 per cent. where the operation has been unduly deferred.

He dilates the cervix with Bossi's instrument in a quarter of an hour. Should, however, the cervix be intact, he prefers opening it up by vertical splitting, when delivery can generally be ended in about ten minutes. Treatment by narcotics, although convenient for the medical attendent by increasing length of intervals between the fits, gives a mortality rate of not less than 30 per cent. Regarding lumbar puncture and renal decapsulation, Bumm reserves his opinion. He favours, however, large subcutaneous saline infusions. He emphasises the importance of keeping the respiratory organs unembarrassed, as aspiration pneumonia is prone to occur. In cases of deep coma it is necessary to keep the air passages free from mucus and blood, and in cases of difficult breathing he has seen satisfactory results from artificial respiration.

On the Use and Results of Bossi's Dilator.

Eicke (*Centralbl. f. Gynäk.*, Leipzig, 1907, No. 46) describes eight cases —five eclampsia, one abortion (with high temperature), one pyometra, and a case of cardiac disease, with nephritis during pregnancy. With the exception of the abortion case, the dilatation of the cervix took on an average thirty-seven minutes. In spite of slow gradual dilatation, laceration occurred in 75 per cent. Of the children, only five were alive when dilatation was commenced, and only one lived after delivery.

From those results Eicke does not favour the use of this instrument, and prefers cervical incisions or vaginal Cæsarean section.

LITHOPÆDION IN A WOMAN, ÆT. 85.

WALLART (*Ztschr. f. Geburtsh. u. Gynäk.*, Stuttgart, 1907, Bd. xlix.) reports the following case of a woman, æt. 85, who died of pneumonia. There was nothing during this illness pointing to pelvic disease. The menopause occurred forty-five years before death, and there was a history of previous abdominal discomfort. At the post-mortem the omentum was found adherent to a hard mass in the left side of the pelvis. Both tubes appeared to be normal. The right ovary was enveloped with adhesions, but there was no trace of the left ovary, its place being taken by irregular calcareous masses. The pelvic tumour was a true lithopædion, the fœtus was fairly well preserved, many of the bones of the skeleton being very distinct. The condition must have been in existence for at least forty years.

TUBAL PREGNANCY.

ELY (*Am. Journ. Obst.*, N.Y., 1907, September) reports the following interesting case:—Patient, æt. 32, was operated on for tubal pregnancy. The right Fallopian tube was removed, half an inch of the uterine end with the corresponding ovary being left. The patient again became pregnant. A tumour, boggy in consistence, was found to the right side of the uterus. Three days later an attack of abdominal pain with syncope occurred. At the operation, it was found that the stump of the right tube left after the first operation was the seat of an extra-uterine pregnancy. A fœtus was found in blood clot free in the peritoneal cavity. Tube and right ovary were excised. The case proves the importance of removing the entire tube, and suturing the uterine end, in cases of tubal gestation.

ADVANCED ECTOPIC GESTATION.

SZABO (*Arch. f. Gynäk.*, Berlin, Bd. lxxxii. S. 105) reports five cases. The first case was one of pregnancy in a rudimentary horn of the uterus, which was enlarged, in contrast to the other horn. A macerated fœtus, 48 cms. long, was removed from the tumour, which was as large as a man's head. The second case was one of pregnancy in a diverticulum of the right tube. The fœtus corresponded in size to full time. The third case was an interstitial pregnancy, which had ruptured at the fourth month, and was treated by supravaginal hysterectomy. The fourth case was a full-time ruptured tubal gestation. In the last case there was a right tubal gestation, with suppuration in the sac. The contents of the sac escaped during operation, and in attempting to remove the fœtus the rectum was torn, necessitating the use of a Murphy's button. This was the only fatal case in the series. Diagrams are given showing the appearance of the sac and fœtus in each case.

THERAPEUTICS.

UNDER THE CHARGE OF
RALPH STOCKMAN, M.D., F.R.C.P.Ed.,
PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY;
AND
FRANCIS J. CHARTERIS, M.D.,
ASSISTANT TO THE PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY.

THE VALUE OF ATOXYL IN EARLY STAGES OF SYPHILIS.

IN an elaborate paper, based upon a series of forty-five carefully investigated cases, Nobl subjects the atoxyl treatment of syphilis to a searching criticism. The conclusion he arrives at is that atoxyl is not nearly so useful or certain in its therapeutic action as mercury. The effect of atoxyl was first tested on a series of seven early cases in which the initial lesion was situated on the inner wall of the præputial sac. In these cases the superficial epithelial layer was wanting, so that locally applied drugs could readily penetrate. In every case the chancres contained abundant quantities of living spirochætes. The local use of atoxyl consisted in the application of 20 per cent. solutions under an impervious dressing, while at the same time the diseased tissue was infiltrated by subcutaneous injections of atoxyl in 10 per cent. or 20 per cent. solution. This injection caused a burning sensation and a transient œdema, which passed off in two or three days. The result of such local treatment was negative. The examination of small portions taken from the surface of the ulcer showed numerous living spirochætes, even after the application of atoxyl for weeks. Clinically, the only improvement obtained was a gradual covering over with epidermis of superficial eroded parts; but though ulcerated lesions cleaned up somewhat, still the irregular eaten-out appearance of the ulcer did not alter. In a series of five cases in which the infection could be accurately placed at from three to six weeks, the infiltration of the primary lesion and surrounding tissue with atoxyl was repeated three to four times at intervals of fourteen days. The primary lesion was then excised at from one to three days after the last infiltration, and examined to determine its content of spirochætes. The only clinical effect of the infiltration was that the hardness of the lesion somewhat diminished, but there was no alteration in configuration or in extent of the lesion. Immediately after the excision the primary lesion was divided into layers, and smears were made from the different levels. Such preparations always revealed a large number of living spirochætes, while preparations made by the silver impregnation method showed results which in no way differed from correspondingly old untreated chancres. The combination of local treatment with intramuscular injections showed that atoxyl in no case prevented the subsequent appearance of secondary eruptions, which appeared quite normal in type. The immediate treatment of the initial lesion has therefore no effect upon the subsequent development of the disease. In connection with this statement it is of interest to note that spirochætes preserve their power of active movements after being suspended for hours in 20 per cent. solutions of atoxyl. In a series of twenty-eight cases with secondary rashes which had received no former treatment, the effect of intramuscular injections of atoxyl were negative. The cutaneous rashes disappeared very slowly, while even at later stages of the disease, *e.g.*, after seven to twelve weeks' treatment, the presence of living spirochætes could be observed. This applied even more to the affections of the mucous membranes, *e.g.*, in the mouth and throat, where the local lesions showed no tendency to heal under atoxyl treatment, while at a late stage of the treatment tonsillar symptoms might be observed which pointed to a progressive local growth of the spirochætes. This refractory condition of the mouth constitutes a very serious drawback to atoxyl treatment. Nobl concludes that it is already perfectly evident that the atoxyl treatment will never seriously compete with mercurial treatment in the early stages of syphilis. The doses used for injection purposes were as follows. Starting with a dose of 0·1 grm., this was gradually raised to 0·3 grm. The total quantity injected varied from 4 to 4·8 grms., and as the injections were given twice a week this quantity represented a treatment extending over a period of from eight to twelve weeks. No serious intoxication symptoms developed except in one case where the patient, after the use of 1·8 grm., developed a nephritis which necessitated the cessation of the injections.—*Wien klin. Wchnschr.*, 1907, No. 44.

PYOCYANASE AS PROPHYLACTIC AND CURATIVE AGENT IN INFECTIOUS DISEASE.

EMMERICH draws attention to certain properties of this enzyme, which indicate that it can be used in the treatment of diphtheria. If the *Bacillus pyocyaneus* is grown in a fluid culture medium, a thick skin of bacteria forms on the surface in a few days. On shaking, this skin falls to the bottom of the culture medium, and a new fibre is formed. On shaking, this second fibre settles down, and the process can be repeated six or eight times. The later growths are less abundant, and in the course of three or four weeks all growth ceases. During this time the deposit of bacteria becomes gradually less voluminous, and eventually is so far dissolved that only a very faint trace remains undissolved. It appears that in the body of the bacterium an insoluble zymogen is contained. On the death of the bacteria this zymogen is set free in the form of a soluble enzyme, to which the name pyocyanase is given. This enzyme can be obtained in a concentrated form if a three weeks' old culture is filtered through a Berkefeld filter and then concentrated *in vacuo* to a tenth of its volume. The enzyme is able to dissolve not only *B. pyocyaneus*, but also many other bacterial forms, notably the diphtheria bacillus and the pyogenic cocci, which are all rapidly dissolved by it. The enzyme possesses other valuable properties. Pyocyanase kills the diphtheria bacillus when added to the culture medium. It also has a marked action in inhibiting the growth of the same bacillus. In addition to these actions, it has an effect upon the diphtheria toxin. Apparently it forms a chemical combination with the toxin which converts it into an inert form. Thus a guinea-pig can be given the toxic dose of diphtheria toxin, but no symptoms follow if it receives a daily subcutaneous injection of 0·5 c.c. of pyocyanase. The enzyme possesses also proteolytic properties resembling trypsin in their action. Thus false membranes are rapidly dissolved. If 3 c.c. of pyocyanase are mixed with 3 grms. of blood fibrin, the fibrin is completely dissolved *in vitro* in the course of four hours. Lastly, the pyocyanase solution exerts a growth-inhibiting influence upon the pyogenic cocci, while at the same time the cocci are dissolved. These actions are of use in the local use of pyocyanase solutions in certain forms of diphtheria, especially when it is complicated by mixed infection with staphylococci and streptococci. In this type of infection the use of diphtheria antitoxin alone is not very successful. The pyocyanase is applied locally to the throat in the form of a spray. The application is repeated frequently at regular intervals, at least three or four times in the day. The effect of such treatment is said to be very marked. The fœtor *ex ore* rapidly disappears. The temperature falls, and the general health improves, while the membrane soon disappears. Under the action of pyocyanase the membrane is not separated in large pieces, but gradually seems to dissolve away. Emmerich has used the pyocyanase treatment along with serum injections in a large number of cases, and claims that it has frequently saved life in cases of mixed septic diphtheria. A number of these cases are recorded, and appear to bear out this claim. Of thirty-two severe cases of this nature, only one child died as the result of a pneumonic infection. In all the others the use of pyocyanase caused distinct improvement in the local appearance and general features of the case. One of the chief advantages claimed for pyocyanase is that under its influence severe complicated forms of diphtheria heal up without any danger of local necrosis of the throat or a general septic infection.—*München. med. Wchnschr.*, 1907, Nos. 45 and 46.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

R. F. C. LEITH, M.B., F.R.C.P.Ed.,

PROFESSOR OF PATHOLOGY, THE UNIVERSITY, BIRMINGHAM.

ON THE STRUCTURE OF OPSONINS.

COWIE and Chapin (*Journ. Med. Research*, Boston, 1907, October) contribute a paper on the reactivation of heated normal human opsonic serum with fresh diluted serum. After quoting the various somewhat conflicting views of the nature of opsonins disclosed by the work of Wright and Douglas, Bullock and Atkin, Neufeld and Rimpeau, Dean, Muir and Martin, and others, determined to apply Bordet's experiment on the reactivation of heated bacteriolytic serum to the study of opsonins. It will be remembered that Bordet found that the serum of an animal immunised against cholera loses its bacteriolytic property on heating to 55° to 60° C. for a few minutes, and regained it again after the addition of a comparativelys mall amount of unheated serum, whether bacteriolytic or not. They used agar cultures of the *Staphylococcus albus.* They collected the blood in the usual way, and washed the leucocytes twice. Of the various possible experimental errors they regard the manner of making the spreads, of staining and of counting, as the most important. They adopted a good plan for correcting possible counting errors. Each slide was marked with a number in ink which was covered over with a plain label, which prevented the number from being seen until the slide was held to the light. The slides were then mixed and counted at random. They draw the following conclusions from their experiments:—(1) In confirmation of the work of others, they found that normal human serum heated to 55° C. or over for ten minutes loses its power to produce phagocytosis, and that normal human serum diluted fifteen times or more with salt solution gives a markedly decreased phagocytosis as compared with undiluted serum, but still higher than the phagocytosis produced by the heated serum or with salt solution alone. (2) If normal human serum diluted fifteen times be added to serum previously heated to temperatures between 55° C. and 60° C. for ten minutes, a phagocytosis is produced which is much greater than the sum of the phagocytosis of the serums taken separately. (3) The phagocytic power of moral human serum heated to 60° C. for ten minutes appears also to be restored to a certain extent by normal guinea-pig serum diluted twenty-five times. (4) It thus appears that there is in the heated serum some substance whose opsonic power can be largely restored by relatively small amounts of fresh serum, and that this is probably due to the presence of two substances in normal human serum whose combined action is necessary to produce phagocytosis; one of these, the thermolabile portion, is probably in excess of the other, the thermostable substance, or else it has a ferment-like action. (5) Opsonins instead of being simple substances like toxins and complements capable of forming "oid" modifications on heating, belong in all probability to that group of antibodies having a double amboceptor-complement structure like the hæmolysins and bacteriolysins. In a further paper in the same number of this journal they endeavour to show that this is the structure of the opsonin in normal human serum for the *Staphylococcus albus.* They found that staphylococci treated with heated serum and then washed are much more readily opsonised by a dilute normal serum, than the same bacteria untreated. That a heated serum loses its power to be reactivated if previously treated with a sufficient number of staphylococci. That if a normal human serum is treated with enough staphylococci to practically remove its opsonic power, there may still be left in the serum a substance which will reactivate a heated serum.

The Opsonic Index in Erysipelas.

Schorn (*Am. Journ. Med. Sc.*, New York, 1907, November) determined the index in thirty-six cases of erysipelas, and treated them with a vaccine which was a uniform mixture of staphylococci from four cases of erysipelas, with the object of observing the effect of the treatment upon the symptoms and progress of the disease. The temperature rose from 0·2° to 0·6° F. in the first few hours after an injection of the vaccine, but he could draw no definite conclusions as to any permanent effect. Neither could he say that the injections had any effect upon delirium. The average duration of the disease in twenty-one of the uncomplicated cases was six and four-fifth days, those receiving 25,000,000 cocci desquamated three days after injection, those receiving 50,000,000 cocci desquamated three and a half days after, and those receiving 100,000,000 cocci desquamated two and two-fifth days after. Migration of the disease was not prevented by the vaccine even when the opsonic index rose. Neither does it prevent recurrence. On the whole, he thinks that the method gives little indication of the severity of the disease and to be of little value in prognosis. In most cases the opsonic index rises during the first three days and then falls, but a relation between the elevation of the index and improvement in the condition of the patient was not observed. The method may have some value, because it seems to shorten the duration of the disease, but even this is not established.

THE OPSONIC TREATMENT OF PULMONARY TUBERCULOSIS.

TURTON (*Practitioner*, 1907, November) gives a record of seventeen consecutive cases of pulmonary tuberculosis forming part of over seventy cases treated by opsonic methods. They were cases of all degrees of severity, comprising early stages, old-standing chronic cases, and cases in which the disease was far advanced. Koch's new tuberculin T.R. was used. The cases are given in detail, but the results need only be given. Seven of the cases did very well, including one of the chronic and one of the advanced cases; four showed improvement, one being a chronic and another an advanced case; and others did not. The causes of failure he thinks to be—(1) Beginning the treatment too late; (2) faulty food and surroundings (the cases were all private, not hospital cases); (3) the strain of the bacillus injected not being the most suitable,—he thinks Paterson's method (*Lancet*, 1906, August 25) may provide a more generally suitable strain; (4) the presence of mixed infections in the patient.

THE OPSONIC INDEX AS A GUIDE TO REGULATE THE TREATMENT OF DISEASE BY VACCINES.

PARK and Biggs (*Journ. Med. Research*, Boston, 1907, October) investigated the opsonic index under the following heads :—

1. *The accuracy with which the opsonic power of the blood can be determined by Wright's method.*—The average counting error amounts to about 10 per cent., while one of at least 20 per cent. may be expected once in about every ten determinations, and an occasional error of 100 per cent. occurs. This error is natural to the technique, and applies not only to the examination of the specimen of blood but also to the measure employed to estimate the amount of opsonins. The measure must be determined afresh in each test with a normal blood. The opsonic power for tubercle bacilli of healthy blood is thought not to vary more than 10

per cent. ; for staphylococci it varies more, and is determined by ascertaining the average opsonic strength of five healthy persons. The measure so obtained will probably vary about 5 per cent. from day to day.

2. *The influence upon the opsonic test of the specific differences between strains of a single species.*—The general practice in laboratories is to use stock cultures of tubercle bacilli, staphylococci, and other bacteria for the opsonic tests, and they, compared with fresh cultures, give sometimes marked differences in the amounts of opsonins, causing the opsonic index to vary as much even as 50 per cent.

3. *The leucocytes to be employed.*—The leucocytes from different persons vary not only in their activity, but also in their selective action, and therefore affect the opsonic index.

4. *The opsonic variation during treatment by inoculations.*—In contrast to Wright's findings of the uniformity of the degree and persistence of opsonins after inoculation, they found great irregularity, but they admit that their experience has been very limited in comparison with his.

5. *The variation in the amount of opsonins in supposedly healthy persons.*—If two normal persons be compared as to their indices for several weeks, marked differences will usually appear. The variations in healthy persons are only slightly less than those of infected individuals.

6. *The opsonic index cannot be known at the time the treatment is given.*—The vaccine inoculation is usually made some time after the opsonic index is ascertained, in favourable cases a few hours after and in many cases from one to several days afterwards. The opsonic index at the moment of inoculation is therefore never known.

7. *The nature of opsonins.*—Their absorption experiments with staphylococci, colon, and tubercle bacilli corroborate the results of Muir and Martin that the normal blood contains thermolabile common opsonins, and that the blood of immune animals contains thermostable specific opsonins, two entirely different classes of substances.

8. *Comparison between opsonins and bactericidal substance in the serum.*—This was made in typhoid infection, and it was found that opsonins and bactericidal substances did not run parallel. The frequent rapid increase in opsonic power within twelve hours of an injection of bacteria is very different from the development of bactericidal strength.

9. *Treatment.*—Twelve cases of local tuberculosis, nine cases of staphylococcus infections, a number of cases of mixed infections of the sinuses of the head, a number of cases of vaginitis in children due to the gonococcus, and three cases of acne, were treated by injections of their appropriate vaccines, with variable success. The localised infections of the subcutaneous or deeper tissues improved in many cases. Generalised infections and inflammations of the mucous membranes were not benefited. The opsonic index did not seem to them to be a reliable guide to regulate the use of vaccines, which were often given without its estimation.

DERMATOLOGY.

UNDER THE CHARGE OF

W. ALLAN JAMIESON, M.D., F.R.C.P.Ed.,

CONSULTING PHYSICIAN FOR DISEASES OF THE SKIN, EDINBURGH ROYAL INFIRMARY.

Present Treatment of Hypertrichosis.

Judging from the advertisements in the daily press, the treatment of superfluous hairs must be a fairly lucrative one, though whether, in all cases, the method advocated is painless and the results justify the offered guarantee, we have not data to determine. Brocq, however, from a long and wide experience, has given us his conclusions (*Internat. Clin.*, Phila, 1907, vol. iii.). He first considers the X-ray process. This seemed to provide an easy mode of dealing with cases where the hairs were thickly set, whether these were downy or coarse, and has now been extensively tried. He arrives at the same deduction as Belot, that we are never thus sure of producing permanent alopecia and at the same time preserving the integrity of the skin, and so it has by no means replaced electrolysis. At the same time, if the drawbacks and inherent risks have been minutely explained to the applicant, this method may be resorted to when the hypertrichosis takes the form of a dark thick down, where a degree of atrophy and vessel dilatation, which may follow the irradiations, is possibly to be regarded as less of a disfigurement. While in cases where there are few hairs, with no great tendency for down to develop into adult hairs, simple evulsion may occasionally secure their final disappearance, repeated extraction is more apt to give rise to the production of a stronger hair with a deeper root. Peroxide of hydrogen is applicable in light cases, as, while it bleaches the hair and so renders it less visible, it at the same time dries it up, makes it friable, and to a certain extent checks its growth. Yet peroxide of hydrogen cannot be relied on, notwithstanding some recent utterances, to permanently destroy hair. Even electrolysis has disadvantages, and these ought to be laid in detail before the patient, prior to commencing to employ it. If the skin has a fine texture, no matter how well the operation is done, it will leave very small, punctiform, white spots. Of the individual hairs dealt with, one or two out of ten hairs will grow again. But besides this, new hairs emerge between the white spots, and if these are anew destroyed, a third, fourth, or even a fifth crop may appear, causing vexation and disappointment both to the operator and the operated on. In order to obtain a satisfactory result, all of these successive crops have to be exhausted with indefatigable patience, and there still will be a visible down on the regions which have been treated. As Brocq says, " This operation is a very easy one, the pain accompanying it is not unbearable and may be disregarded, but it is very difficult to do it well." Unless perhaps in the case of hairy moles, no two hairs should be treated close enough to each other for the circles of destruction of the surrounding tissues to become tangent, otherwise scars which may eventuate in keloid are apt to arise. Electrolysis is slow, the necessary number of applications may be great, and the demand on the purse considerable, yet on the whole it is preferable to radiotherapy. There still remains the simplest plan of all, namely, shaving. Brocq regards this as liable to increase the vitality of the hairs themselves, and to favour the transition from downy to adult ones. Still, it is the only practical method for those unfortunate women with marked beards, for whom the previously mentioned measures are inapplicable.

Does Chrysarobin exert a Toxic Effect on the Kidneys?

Notwithstanding the frequency with which chrysarobin is employed in general practice and by specialists, it has not yet been positively determined either how much is absorbed, or if kidney irritation arises therefrom. Diverse and indefinite expressions of opinion appear under this heading in dermatological treatises. Winkler (*Cor. Bl. f. schweiz. Aerzte*, Basel, 1907, September 15) has, therefore, set himself to answer the following questions:—(1) Can one excite nephritis in rabbits by the internal or external exhibition of chrysarobin, and if so with what doses? In reply to this, various experiments elicited the conclusion that internal administration did not succeed in producing nephritis in rabbits, although relatively large doses were given, and the animals were watched for some time after its discontinuance. When chrysarobin was subcutaneously injected in rabbits, chrysophanic acid appeared in the urine after a time, but not albumin. (2) Is there any danger of nephritis in the course of the ordinary treatment of psoriasis by chrysarobin? A large number of patients under treatment by chrysarobin had their urine kept under observation. The result was that any risk of kidney irritation is negligible. Even when severe chrysarobin dermatitis occurs, the ensuing absorption is so small, that only in very rare cases does it lead to the appearance of albumin or to the production of nephritis. Still, he regards it as desirable to have the urine examined for albumin previous to and during the period of treatment.

New Researches on the Microsporums.

In a series of copiously illustrated articles (*Ann. de dermat. et de syph.*, Paris, 1907, March–June) Sabouraud states the results of his latest investigations into the nature and characters of the small-spored fungi of ringworm. He emphasises the point, that in carrying out their studies, observers should employ identical methods of cultivation if deductions capable of comparison are to be attained. The source and features of each case sifted ought to be carefully noted, and a reserve of hairs and epidermic scales duly preserved and labelled for future experiments. He enters into full details of the composition of the media which he employs. He does not say that they are possibly the very best, but they are those he has used from the first, are readily obtained, are not liable to vary in composition, and hence parallel conclusions can be drawn. He then describes a variety which so far does not appear to have been isolated in this country, called the *Microsporum lanosum* from the peculiar woolly aspect of the colonies. It differs from the ordinary

Microsporum Audouini inasmuch as it can be successfully inoculated into guinea-pigs. In the examination of the affected hairs he prefers a strong to a weak solution of caustic potash, and after washing he mounts in glycerin. An alternative method is by using formic acid as a clearing substance, and subsequent mounting in balsam. In this way the hairs are not rendered so transparent, while the fungous elements appear smaller. The microsporum primarily attacks the epidermis and secondarily insinuates itself into the follicle, where it finds in the débris filling up the follicular funnel-shaped opening, abundant material for growth. The mass of parasitic vegetation in the follicular ostium has no analogue in the series of mycosic diseases except the favus scutulum. It is composed of giant filaments made up of enormous rectangular cells, set end to end, and mixed with these, forming islands between them, are many oval sporular particles, not much smaller. The hair at this level is healthy. The direction of the mycelial threads is always downwards. The point where the mycelium penetrates into the interior of the hair is about the middle of the radicular portion, and it raises up the imbricated scales of the cuticle at ten or twenty different spots. Within the hair there also exists a system of descending mycelium of finer character, becoming more and more plentiful the nearer the hair root. Some of the filaments terminate under the sheath of spores which invest the hair. Others end in a vertical or terminal bundle of threads, known as the fringe of Adamson, from its first describer. A peculiar characteristic of the microsporums is the formation of a dense grey sheath, composed of masses of spores kept in place by an envelope of the follicular epidermis, which is torn away when the hair is forcibly extracted. The mode of production of this immense mass of covering spores has not, so far, been thoroughly explained. There are several theories to account for it. No doubt many of these spores are produced by the fission of the descending external mycelium. Others, according to Sabouraud, are derived from the intrapilar mycelium which reaches the surface of the hair, and there breaks up. But the growth of the hair, though diseased, is uninterrupted. May it not very well be that the accumulation is, in some measure at least, due to there being a residuum constantly left behind and so increasing as the hair ascends; for outside the follicle, especially in old-standing cases, the sheath of spores is less in its thickness, and becomes very scanty but a short distance above the level of the scalp?

DISEASES OF CHILDREN.

UNDER THE CHARGE OF

G. H. MELVILLE DUNLOP, M.D., F.R.C.P.Ed.,

PHYSICIAN, ROYAL HOSPITAL FOR SICK CHILDREN, EDINBURGH.

ANÆMIA INFANTUM PSEUDO-LEUKÆMIA (VON JAKSCH).

KOPLIK, in this interesting and exhaustive paper, commences by reviewing the literature of the subject. He points out in the first place that the disease, as originally described by von Jaksch in 1889, was thought to be a primary blood disease peculiar to young children, in which there was oligocythæmia, oligochromemia, a high degree of leucocytosis, a tumour of the spleen, swelling of the lymph nodes, and moderate swelling of the liver.

Monti, Tessier, J. S. Fowler, and others adhered to the original idea of von Jaksch that they had to deal with a primary specific condition or disease of the blood. The idea of von Jaksch that there must be a leucocytosis in all of these cases has now been generally abandoned, for undoubted cases have been published corresponding in all particulars to the disease described by von Jaksch, which at certain periods did not show leucocytosis.

Fischl and Wentworth support the author's belief that the disease is a secondary anæmia due to disturbance of nutrition, acting on the blood-forming organs, the spleen, and the liver, causing changes in the blood owing to a disturbance in the function of these organs, but in no sense to be interpreted as a primary disease of the spleen or bone-marrow. The third hypothesis, which is supported by Luzet, Weil, and Lehndorf, is that von Jaksch's anæmia is nothing more nor less than a type of myelocytic leukæmia in children, and is modified in its pathology and blood picture by the complicating conditions of this period of life, namely, syphilis and rickets. The author points out that there has been no known case presenting the symptom complex of von Jaksch's pseudo-leukæmia developing into a true leukæmia.

He gives the following detailed account of the blood examination of nine personal cases. The hæmoglobin ranged from 28 to 65 per cent. The red blood corpuscles in some cases fell as low as 1,400,000, and in others as high as 4,448,000. The leucocytes ranged from 5200 in one case to 80,000 in another. In all these were nucleated red blood cells, normoblasts, megaloblasts, from a number in each field to 7 or 15 per cent. of the red cells counted. In some cases, at various times, the white blood corpuscles varied in number from 11,000 to 80,000 in the cubic millimetre, with a red blood count of 2,600,000 to 3,700,000. It is necessary to have repeated counts to form a correct idea of the white and red blood cells.

The polynuclear leucocytes formed in some cases 80 per cent. of the white blood cells, and in others fell as low as 15 per cent., and sometimes in the same case within a few days they would vary from 45 to 15 per cent. Myelocytes were present in all cases, varying from a ½ to 7 per cent., and eosinophiles were present in normal percentages in all cases.

The study of the blood picture tends to confirm the belief that there is not a definite pathological picture in this disease of anything but severe anæmia in subjects on whom any disturbance of the blood-forming organs causes a retrograde to the fœtal type.—*Trans. Am. Pediat. Soc.*, Phila., vol. xviii. p. 100.

Scarlatinal Nephritis.

From a study of a hundred cases of scarlatinal nephritis and an examination of sections from a hundred kidneys, half of which were observed during life, Eric Wilkins (University Research Fellow in

Medicine) comes to the following conclusions:—Nephritis is present in about 6 per cent. of all cases of scarlatina, and of this 6 per cent. hæmaturia is present in 3 per cent. It is more common in males, and especially between 5 and 9 years. Beyond the fact that scarlatinal nephritis is probably due to a combination of toxic absorption and of decreased excretion, little is known of its etiology. There is no evidence to show that chill has anything to do with its causation.

Two hundred cases were kept in bed for three weeks, and another 200 were allowed up when the temperature became normal, and, as a matter of fact, nephritis was less frequent in the latter. Excessive desquamation plays a very slight part in the causation of nephritis. The question of infectivity of nephritis is of importance, as there is no doubt of the frequency of epidemics in the wards making it advisable to isolate all cases of nephritis. It is the neglect of this principle that makes the ordinary home a safer place for a scarlatinal patient than a fever hospital.

There is no doubt in the author's mind that oral sepsis is the chief operative factor in the production of nephritis. The most hopeful line of prevention is the isolation of septic or nephritic cases; the treatment of oral and faucial sepsis, and by the injection of the anti-streptococcus serum in toxic cases. The early recognition of the disease is important, as few conditions are more amenable to treatment.—*Med. Chron.*, Manchester, 1907, October.

THE RELATIVE VALUE OF THE OPSONIC INDEX AND TUBERCULIN IN THE DIAGNOSIS AND TREATMENT OF TUBERCULOSIS IN CHILDREN.

As greater interest is aroused in the question of tuberculosis, the demand for making an early diagnosis grows more urgent, especially as at the present day early diagnosis frequently means cure of the disease. The present is a brief abstract of a paper by Morgan Rotch and Floyd (*Journ. Am. Med. Ass.*, Chicago) treating of forty children who lived in tuberculous families, in twenty-five of whom definite signs of consolidation at one apex were found. With the exception of two of the cases, all the children seemed perfectly well and free from symptoms. By recognising tuberculosis at this early stage, before tubercle bacilli are thrown out in the sputum, an endeavour to prevent the dissemination of the disease is greatly aided.

The two means at present at our disposal for the early detection of tuberculous infection are the tuberculin test and the opsonic index. Tuberculin is a powerful agent, and, on account of its ability to do harm in inexperienced hands, should only be used with the greatest care by trained observers. The writers use the following method. The solution for using the test is prepared by taking 1 c.c. of Koch's old tuberculin and adding to 999 c.c. of boiled distilled water; 1 c.c. of this solution equals 1 mgrm.

The dose of the solution for an infant is from 2 to 5 mgrms., according to age, which should be injected with antiseptic precautions. If the child is not tuberculous, no symptom will be noticed, but if it is tuberculous the temperature will rise in eight to twenty-four hours after the injection, and will fall again within twenty-four hours. During the period of reaction there is generally some malaise, but there seems to be no danger of any serious results. A positive reaction will be obtained in about 95 per cent. of cases of tuberculosis. A negative reaction, although it does not exclude tubercle, is very strong evidence against it. If before the tuberculin is injected the child has had a swinging temperature, the test is not found to be of much value.

It is still a disputed point whether it is better to begin by giving small doses, gradually leading up to the dose which will produce reaction, or to give a reacting dose at once. Although in favour of the former method, it is to be remembered that too large doses are as dangerous as too large doses of any other dangerous drug which may prove fatal. Usually $\frac{1}{10}$ mgrm. is given as the initial dose, followed in three days, if there has been no reaction, by 1 mgrm., and in other three days by 3 or even 5 mgrms., according to the age of the child. A positive reaction consists not only in a rise of 1 or more degrees of temperature above the previous level, but when also within twenty-four hours the patient complains of headache, nausea, vomiting, diarrhœa, pains at the site of injection, and especially in the appearance of harsh or cog-wheel breathing at the suspected area, without a rise of temperature. Some cases give all these symptoms, others very few, but an examination of the chest immediately following an injection is of great importance.

The opsonic index may be a great aid in diagnosing cases when, on account of extreme prostration or of a high irregular temperature, tuberculin cannot be given. If we follow the index in a case of pulmonary tuberculosis, we find it runs in three different ways, low, high, and fluctuating, and they are of importance from a diagnostic point of view in the order given. A low index may mean tubercle or a lowered general resistance to the tubercle bacillus.

When the index is constantly high, tuberculosis is practically always present. The fluctuating index is still of greater value, in that it indicates overdosage of the system with products from a tuberculous focus, and we therefore get a series of positive and negative phases. Of still more importance is the treated serum reaction. This test is made in the same way as the ordinary opsonic index, except that both the normal and pathologic sera are treated for ten minutes at 60° F. in water before using. In the treatment, minute doses, steadily increasing and extending over several months, should be given, seeking, if possible, to avoid reaction. This will increase the patient's resistance, improve the general condition, and aid in healing the process. The authors having used small increasing doses over a long period of time, have had many favourable results. Reactions were very few, and they feel encouraged to continue their observations.—*Journ. Am. Med. Ass.*, Chicago, 1907, August 24.

REPORTS OF THE MEDICAL SOCIETIES.

Edinburgh Medico-Chirurgical Society.—*Wednesday, December* 4, 1907.—Dr. James Ritchie, President, in the chair.—Dr. Aitchison Robertson gave a demonstration on the sterilisation of milk by Buddisation; and, on the invitation of the President, Dr. Budde, the inventor of the process, read a short account of his method. The milk is brought from the various cow-stocks to a central place. It is then cooled to ordinary water temperature, but no further, as excessive cooling destroys the natural antibacterial qualities of milk. The milk is then passed through a heater, where it is heated to 50° C. (122° F.). It is centrifuged, to remove all particles of dirt and the bacilli adhering to them. The milk is then mixed with peroxide of hydrogen, in the proportion of 45 c.c. to each gallon of milk. The mixture is kept at 50 C. for three hours, being slowly stirred all the time. It is then filled through sterilised tubes into sterilised bottles, and cooled. Peroxide of hydrogen is in itself a germ destroyer, but the milk catalase causes a still stronger bactericidal action to take place, which arises from the formation of nascent oxygen. It is as well to use a slight excess of peroxide, so as to have a trace left at the end of the process. Then, immediately before bottling, a few drops of a catalase solution are added. Milk, after being subjected to the foregoing treatment, possesses the following qualities:—None of the component parts of raw milk are in any way altered; the milk is practically sterile, and keeps considerably longer than ordinary milk; it is absolutely free from foreign substances; the taste and flavour and the nutritive qualities of the milk are quite unaltered.—Dr. Goodall read a note "On the Action of Certain Salts of Formic Acid on the Circulatory and Muscular Systems." The experiments had been carried out with the assistance of Miss Isabel Mitchell, B.Sc. The salts used were the soda, potash, and calcium formates; and experiments on the blood pressure, on the vessels of the isolated heart, and on nerve muscle preparations of frogs, all went to prove that the formates are toxic in action, and accelerate fatigue. Experimental observations on man led to the same result. The general conclusion is that the formates are not of much therapeutic value, and that calcium formate is of some use as a hæmostatic, chiefly because of the calcium it contains. In the discussion which followed, it was pointed out that, despite the conclusions arrived at in the paper, the therapeutic results of the administration of formates are undoubtedly good.—Mr. J. W. Struthers read a paper "On the Value of Novocain as a Local Anæsthetic," which appears in current number.—Dr. Alexander James read notes on cases of tuberculous anæmia. These cases show the typical symptoms of anæmia, but the blood is practically normal. The probability is that the anæmia is due to a diminution in the volume of the blood. Signs of old or active tubercle in the lungs can always be found, and the proper treatment is not to give iron, but to combat the tuberculous mischief by the usual remedies. Arsenic is frequently of service.—Dr. Alexander Bruce read a paper entitled "Unusual Sequela of Herpes Zoster" (? "Posterior Poliomyelitis"). A severe attack of herpes zoster was followed, after a short interval, by numbness passing up one lower extremity and down the other. There was also muscular weakness of the right lower limb, with exaggerated deep reflexes and extensor plantar reflexes, and loss of pain and thermal sense, with conservation of tactile and muscular sense below the level of the herpetic zone. The provisional diagnosis was a lesion at the base of the posterior cornu, first of one side and then of the other, probably of vascular origin. Recovery was almost complete. These cases are usually regarded as purely functional, but in this case the affection of the deep reflexes pointed to an organic lesion of the cord.

CLINICAL MEETING IN ROYAL INFIRMARY.—*December* 18, 1907.—Dr. JAMES RITCHIE, President, in the chair.—Dr. ALEX. BRUCE showed —(1) A case of syringomyelia; (2) a case of hemiatrophy of the tongue, with nystagmus; (3) a case of neuritis of the median nerve; (4) a case of myasthenia gravis; (5) a case of amyotrophic lateral sclerosis; (6) a case of aneurysm of the internal carotid artery ruptured into the cavernous sinus; (7) unilateral exophthalmus in a female after oöphorectomy.—Professor CHIENE, C.B., showed—(1) A case of wryneck treated by displacement downwards of the upper attachment of the sterno-mastoid muscle; (2) a man from whose elbow-joint a loose body had been removed; (3) an instrument for measuring the length of the lower extremities; (4) a shield for wearing over the mouth and nose when operating; (5) a support for flat foot.—Mr. CAIRD showed patients after operations of—(1) Gastrostomy, (2) pyloro-gastrectomy, (3) idiopathic dilatation of the colon, (4) acute pancreatitis. Preparations from some of the cases were also shown.—Dr. R. W. PHILIP showed patients illustrative of the cutaneous and ophthalmic tuberculin reaction.—Mr. ALEXIS THOMSON showed—(1) A patient after operation for removal of carcinoma of the cæcum performed in two stages; (2) a patient, æt. 53, after operation for acute intussusception; (3) a patient who had sustained an injury to the musculo-spiral nerve through a gunshot wound. The distal end of the nerve was inserted into the median, as suture was found to be impossible.—Mr. W. J. STUART for Mr. HODSDON showed—(1) A patient after operation for renal hydatid; (2) a case of Dupuytren's contraction after treatment with fibrolysin (Merck).—Mr. SCOTT CARMICHAEL showed—(1) A boy who had recovered from acute suppurative peritonitis; (2) a girl after severe compound fracture of the skull and hernia cerebri; (3) a girl, æt. 3, after resection of the cæcum and ascending colon two years ago for tuberculous stricture; (4) a boy with chronic arthritis of the wrist, of doubtful diagnosis.—Mr. CATHCART showed a case of trigeminal neuralgia cured by removal of the Gasserian ganglion.—Dr. NORMAN WALKER showed cases of—(1) Pemphigus foliaceus; (2) tuberculous dermatitis; (3) chronic syphilis of the skin.

EDINBURGH OBSTETRICAL SOCIETY.—*December* 12, 1907.—Professor STEPHENSON, President, in the chair.—Dr. DINGWALL FORDYCE read a paper on "The Practice of Artificial Infant-feeding." He discussed the nature of the food best fitted to replace maternal milk in healthy infants and in those whose digestive ability was defective. He condemned the use of proprietary foods unless under special circumstances, and advocated the use of modified cow's milk in the first instance in all cases. Dr. Fordyce recommended that the physician should prescribe exactly the contents of the child's "bottle," and showed how the food constituents should be increased in healthy infants and diminished in those with digestive disturbance. In conclusion, the feeding of babies suffering from certain symptoms such as diarrhœa and vomiting was considered.

Glasgow Medico-Chirurgical Society.—*November* 29, 1907.—Dr. Walker Downie, President, in the chair.—Dr. J. S. M'Kendrick read "Notes of a Case of Mediastinal Cancer," which occurred ten years after operation for cancer of the breast. Secondary nodule formed over the head and trunk, and most of these disappeared under the X-rays.—Dr. David Newman described a series of cases of renal calculus. He drew attention to the fact that pain might be referred to any part of the urinary tract on the same or opposite side. A definite guide to the affected side could be gained by inspection of the orifices of the ureters. There was congestion of the mucous membrane around the orifice on the affected side, while examination of the "shoots" of blood or pus furnished a further and definite indication. The cystoscopic appearances were shown by means of the opaque projector. X-rays were also useful in diagnosis, if a positive result was obtained, but a negative result did not exclude calculus.—Dr. James R. Riddell showed lantern illustrations of the X-ray photographs of the cases described.—Dr. Walker Downie described—(*a*) A case of macroglossia, and (*b*) a case of acute glossitis, which followed a small abrasion, and led to suppuration. The organism found was the *Streptococcus pyogenes.* Recovery followed evacuation of the abscess.

Friday, December 20, 1907.—Dr. Walker Downie in the chair.—Dr. James Galbraith Connal showed—(*a*) A series of seven patients with abnormal pulsating vessels in the pharynx. He had seen nine patients with this condition during the past few years. Six were women and three were boys. In three the condition was bilateral; of the other six, in five the right side and in one the left side was affected. The apparent size of the vessel varied considerably, and in some cases the condition was believed to be due to the tortuosity of the internal carotid, in others to abnormal situation of the ascending pharyngeal artery. (*b*) A patient operated on for chronic, purulent middle-ear disease, with involvement of the lateral sinus, in whom the internal jugular vein had to be ligated in the neck. The patient made a good recovery.—Dr. Archibald Young showed a patient with multiple exostoses of the thorax and long bones. The patient, a man, had other well-marked rachitic deformities, and the exostoses showed a definite relation in their distribution to the sites of rachitic deformity and thickening.—Dr. M. Logan Taylor and Dr. John H. Teacher gave a demonstration of "Double Tumours." While specimens were shown of cases where sarcoma and carcinoma had originated in the same individual as separate tumours, the cases specially referred to were where the two types of cellular growth were to be found side by side or intermixed. In most of the specimens the two growths were seen under one field. In one case of melanotic sarcoma of the eye (with alveolar cancer in the tumour mass) secondary growths occurred seven years after removal, and practically no tissue of the body was exempt from these. In the spleen only sarcomata were found, but, in the liver, sarcomata and carcinomata were found; and the suggestion was offered that the secondary sarcomatous growths there had stimulated the development of the carcinomatous nodules.—Dr. IVY M'KENZIE made a short communication upon "The *Spirochæta pallida* and its Etiological Relationships to Syphilis."

FORFARSHIRE MEDICAL ASSOCIATION.—*December* 5, 1907.—Dr. RORIE in the chair.—Dr. GUILD showed two patients after operation for abscess of the brain following middle-ear disease. The first was that of a boy, æt. 10 years, who from infancy had suffered from an intermittent discharge from the right ear. Three weeks previous to the onset of the acute symptoms he got a blow on the head, and his mother attributed to this the headache which followed, accompanied by vomiting and shiverings. He was sent to the Infirmary, where on admission he was found to exhibit all the symptoms associated with abscess of the brain, along with a fœtid discharge from the ear. The radical mastoid operation was performed, all the carious bone cleared away, the sinus exposed, and further examination led to the discovery of an abscess in the cerebellum half an inch below the surface. This was opened, a gauze drain inserted, the cavity plugged. The treatment was followed by a complete abatement of the acute symptoms, and he made an uninterrupted recovery. The second case was that of a girl, æt. 16 years, in whom the symptoms of cerebral abscess were masked by acute suppuration in the mastoid, and the possibility of meningitis or sinus thrombosis. She was suddenly attacked with headache and severe pain behind the eyes, pain in limbs, high temperature; the symptoms pointed to an attack of influenza. Shortly afterwards tenderness and œdema developed over the left mastoid, and discharge came from the ear. The mastoid was opened up and cleared of pus and débris, and an abscess discovered in the cerebrum just above the mastoid. This was opened and drained, and she also made a good recovery.—Mr. GREIG showed a specimen of teratoma of the testis removed from a child æt. 13 months. The condition was discovered some months after birth, and consisted of a solid oval swelling of the testicle, the size of a small date. Microscopic examination revealed the presence of muscle gland, nerve cartilage, etc. etc., the tissue of every organ in the body practically being represented in the tumour.—Mr. GREIG also read a paper on "Intermittent Claudication," which will appear in the Journal.—Dr. R. C. BUIST read a paper on "The Use of Hyoscine and Morphia in the Management of Labour." He referred first to the use of chloroform in labour, and spoke of the difficulty in always getting just that degree of anæsthesia which was necessary to subdue the pain without causing delay in the progress of the labour, if not constantly watched, which in so many cases involved a great expenditure of time on the part of the obstetrician. By the hypodermic injection of hyoscine and morphia this ideal obstetric anæsthesia could be produced. For this purpose he used $\frac{1}{100}$ gr. of hyoscine and $\frac{1}{6}$ gr. of morphia; this he thought was the best proportion, but it could be varied in amount according to the requirements of individual patients, it being necessary in those who bore the pains badly to increase the amount of morphia. The effect was generally produced in about fifteen minutes and fully developed in an hour.—Dr. DON read notes on three cases of stricture of the œsophagus, in which he spoke of the value he found in X-rays for the diagnosis of the exact site of the stricture.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL.

The Druce Case. THE exhumation of the body of Mr. T. C. Druce, which was recently carried out under such dramatic circumstances, has brought into notice many interesting points in connection with the identity of human remains after a long period of burial. It cannot be affirmed that any novel facts have been disclosed in regard to this important subject, nor indeed was it to be expected. Every medico-jurist was aware that if a body has been buried in a well-built vault after being placed in an air-tight metal shell and coffin, after thirty years and even a very much longer period, the corpse will in all probability be comparatively unchanged, or, at any rate, be capable of identification. We need only recall the well-known instance of King Charles I., whose remains were completely identified by the striking resemblance of the countenance to his portrait on coins, busts, and extant paintings. An interesting narrative of this exhumation was published by Sir Henry Halford. Another even more remarkable case was the identification of King Henry IV. in Canterbury Cathedral after the lapse of nearly four centuries and a half.

In connection with the Druce exhumation, one question was raised incidentally by a question from the Bench, to which we wish to refer. It will be in everybody's remembrance that a considerable amount of discussion arose at the hearing of the evidence prior to the exhumation as to existence and character of the beard of Mr. Druce and his alleged impersonator. When the body was exposed to view, it possessed, in good preservation, a natural growth of hair on the face, which was identified as bearing an excellent resemblance to the beard of Mr. Druce. Mr. Plowden put a question to Dr. Pepper, which was a perfectly intelligible one for a layman to put, but which on the part of an educated medical man would have been ludicrous. "Is it possible for hair to grow after death?" Dr. Pepper is reported to have replied, "Just a little. It would be more the shrinking of the skin." In early works on medical jurisprudence there is evidence that the growth of the hair and nails after death was firmly believed in by many, and, even in more recent times, several so-called well-accredited cases are stated to have occurred. Bartholinus relates the case of a man who had short black hair and a beard at the time of his burial, and who, some time after death, was found to have long and yellowish hair. Haller, however, gave the *coup de grâce*, at any rate for a time, to all such fantastic rubbish, by a scientific discussion of the question, and ever since, his explanation of the apparent growth of hair after death has been generally accepted. He explained it by the desiccation or shrinking of the skin after death, which thus gives an appearance of slight growth to a recently shaved beard. There the matter rested until, as was to be expected, America came to the rescue last century with several "well-authenticated" instances. First, there is the well-known case of Desha, indicted for the murder of the man Baker, in which it was alleged that the victim's beard had grown longer in the course of a few days after the murder had been committed. Then we have the case reported by Dr. Caldwell of Iowa, in 1862, which is the rock upon which all true believers take their stand, but which we venture to affirm is as little "authenticated" as the usual run of reported cases of burial alive so frequently reported from the same country. Dr. Caldwell records that he was present at the exhumation of a body which had been buried for four years. He found that the coffin had given way at the joints, and hair protruded through the openings. He had evidence (?) to show that the deceased was shaved before burial, nevertheless the hair of the head measured 18 in., the whiskers 8 in., and the hair of the breast 4 or 5 in. But what is a growth of 18 in. in four years! Listen to this, and from a reputable text-book too! "Quite recently, in unearthing the remains of an old cemetery in Washington, District of Columbia, a number of persons (*sic*) noticed that when the body of a young girl, supposed to be about 12 or 13 years of age, was taken up, it was found that her hair had grown until it extended from her crown to her feet." And then it proceeds: "Many careful observations seem to prove the molecular life of the hair and nails after somatic death." We may add yet another case mentioned in the *Daily Mail* of 10th January, where a correspondent writes that a relative of his in Essex, on visiting a vault, found white hair, "which had evidently grown after death," protruding from the crevices of a coffin.

Such are the cases and such the "careful observations" which serve to bolster up a belief in the growth of hair after death, and which we regret to find have even induced the latest editor of Taylor's great work to print the question in leaded type and apparently in all seriousness, "Can the hair grow after death?"

The New York Epidemic of Anterior Poliomyelitis.

THAT acute anterior poliomyelitis is somewhat capricious in its incidence, is well known; an occasional seasonal prevalence has not escaped notice, and groups of cases occurring in quick succession have frequently been reported from different countries. In New York, however, what may be called a veritable epidemic of the disease has prevailed since the summer of this year, and has attracted so much attention, that a collective investigation has been initiated by the New York Neurological Society. The extent of the epidemic may be gathered from Dr. Collins' calculation that upwards of a thousand cases have occurred, while from the records of the Hospital for the Crippled, to which more patients suffering from infantile paralysis drift than to all the other institutions in the city, it appears that there were 550 cases of anterior poliomyelitis in the year ending 30th September 1907, in comparison with 379 cases during the preceding twelve months. Of this great number, nearly 300 occurred in August and September alone. The epidemic has so far thrown no fresh light on the cause of the disease: temperature, humidity, insanitary surroundings seem to have no relation to it. In no single district of the city has there been any special prevalence; there have been several instances of the attack of more than one child in a family. Happily, the epidemic has been mild in so far that complete recovery has occurred in an unanticipated number of patients; on the other hand, the bulb and pons have not infrequently been attacked, and such cases, of course, succumb early. As was to be expected, the epidemic has revealed aberrant types of the disease, and probably the clinical picture we have formed of it will undergo modification in consequence. Rigidity of the neck, suggestive of meningitis, has been an early symptom; tenderness over peripheral nerves, simulating neuritis, has not infrequently been noted to precede the onset of paralysis. Collins describes the type of case prevailing as one beginning in the classical fashion : extensive paralysis, speedily recovered from except in one or two groups of muscles. These last, however, instead of atrophying, slowly regain their function. It would serve no purpose to speculate on the pathology of the disease, suggestive though its analogies are to epidemic meningitis. It would be interesting to know whether, side by side with the anterior poliomyelitis, there has been any undue prevalence of herpes zoster, a disease which bears many resemblances to the former. No doubt the report of the collective investigation will tell whether this be so or no. The pathological studies which have been made in New York and Boston (where the disease is also unusually prevalent) show that the name "anterior poliomyelitis" is to some extent a misnomer, and that there is a general infective inflammation of the whole central nervous system.

The existence of epidemic anterior poliomyelitis in America, coming as it has done after a visitation of cerebro-spinal fever, cannot but warn us that the same experience may be in store for this country. The knowledge that aberrant attacks are plentiful in such epidemics ought to prevent the earlier cases passing unrecognised. It is to be hoped that the experience which the present epidemic affords will lead to the discovery of the cause of this serious malady, by giving the bacteriologist and the chemist opportunities they have never hitherto enjoyed of thoroughly investigating conditions during the acute onset.

The Teeth of School Children.

THE comparatively recent awakening which has taken place in this country in regard to the question of physical deterioration and its causes, has resulted in drawing public attention to the conditions of school life as an important factor conducing to the evils complained of. Growing sentiment and knowledge has led to a unanimous demand for this question to be investigated in a thorough and scientific manner, with the result that already throughout the country educational authorities are taking action and inaugurating a system of medical inspection of the children under their charge. In a direction in which but a short time ago we believe that any person suggesting official interference would have been regarded as a pronounced faddist, evidence is slowly accumulating which indicates not only a most important cause of physical deterioration, but one which we do not doubt will lead to stringent measures of prevention.

We refer to the prevalence of decay of the teeth amongst children at school ages, and the injurious effects which this entails.

In a report to the London County Council by Dr. James Kerr, reference is made to the work of Dr. Marion Hunter amongst the school children of the metropolis. She found that teeth troubles begin early in life, and out of 700 infants, at the time of their admission to school, there were only twenty in whose teeth there was no obvious decay; 205 children had each two diseased teeth, 152 had from three to five, and the remaining 323 had each more than five. In a report submitted by Dr. Newsholme to the Education Committee of Brighton, the facts are even more striking, inasmuch as the statistics cover a much larger number of children. In all, 3739 boys and 3587 girls, or a total of 7236 scholars, were examined, and of these three out of every four had one or more decayed teeth. In other words, 76·8 per cent. of all the children had carious teeth, and boys and girls were found to suffer to an equal extent.

Of the total 5623 children with carious teeth, 215 required filling of the teeth, 4827 extraction, and 581 both filling and extraction. It goes without saying that a great many other morbid conditions of the mouth and throat were present, such as enlarged tonsils, adenoids, and purulent inflammation of the gums.

How injurious such conditions are upon the health, more especially of persons of tender age, both in rendering them more susceptible to acute infections and in interfering with their future working capacity and physical fitness, it is unnecessary to accentuate.

The practical question which arises is, What can be done to combat the evil? It is a problem fraught with many difficulties, financial and administrative; but we have great hopes that facts such as the above will force recognition of the proposition, that it is as much the duty of the State to safeguard the health of children as it is to exact a knowledge of the three "Rs."

Professor Hoffa.

The news of the tragic death of Albert Hoffa at the early age of forty-eight caused a painful shock to his many friends and admirers in this country. At the recent Surgical Congress in Paris, we had the privilege of seeing him operate, and had the opportunity of becoming acquainted with his sterling qualities. Of manly bearing and fine presence, he spoke excellent English, probably in virtue of his having been born in South Africa, and he could demonstrate a difficult subject in French with almost equal facility. A sportsman in our sense of the term, and also in the German, for he had the much prized scars on his cheek dating from his student days in Freiburg, he met his death through a collision while motoring.

His great reputation was made while Professor in Wurzburg, when he produced among a large number of notable works his "Text-book of Orthopedic Surgery," which has reached a fifth edition, and has been translated into the majority of living languages. In 1902 he was made a Privy Councillor, and was summoned to the Chair in Berlin, succeeding the celebrated Julius Wolff. He was a man of warm heart, a good friend and of infinite courtesy to his juniors, to his students, and to his patients; his life thus untimely ended was one of great achievement.

Vital Statistics of Edinburgh during 1907.

The estimated population last year was 345,967, an increase of 4727 inhabitants since 1906. The total number of deaths recorded was 4978, giving a death-rate of 14·38 per 1000, as compared with 14·25 and 14·26 in 1905 and 1906 respectively, which are the lowest death-rates ever recorded for the city since statistics have been available. Of the total deaths, 903 occurred under 1 year of age, 529 between the ages of 1 and 5 years, 609 between 5 and 30, 1318 between 30 and 60; and there were 1619 deaths above the age of 60, of which thirty-four were persons above 90 years. The deaths due to zymotic diseases numbered 326, of which 164 were due to whooping-cough, seventy-five to measles, thirty-two to diphtheria, twenty-four to scarlet fever, eleven to enteric fever, ten to erysipelas, and ten to puerperal fever. The corresponding notifications of infectious diseases were — scarlet fever, 1110; diphtheria, 635; enteric fever, 103; erysipelas, 300;

and puerperal fever, 19; while there were in addition 650 cases of phthisis and 206 patients with cerebro-spinal meningitis reported. The number of births registered during the year was 7504, giving a birth-rate of 21·68, which is the lowest birth-rate so far recorded in any year. Although this progressive diminution in the birth-rate is not a local phenomenon, but is exhibited throughout practically the whole kingdom, yet it is so marked in Edinburgh that it might well form the subject of local investigation. It is the one disquieting feature in our vital statistics, which otherwise indicate satisfactory progress in the improvement of the health and welfare of the community.

WHILE many will have heard of the retirement of Dr. Clouston from the position of Physician Superintendent of the Royal Asylum, Morningside, with regret, yet it has not come as a surprise to his friends. Dr. Clouston has been so active in the discharge of all his professional duties, and has taken such a prominent part in medical questions of public and social interest during recent years, that few have realised that he was becoming a veteran, and that nearly fifty years of professional life lay behind him. While his retirement from official work at the Royal Asylum will be a great loss to that institution, it is satisfactory to know that it has not been brought about by ill-health or failing powers. We are glad to know that Dr. Clouston intends still to reside in Edinburgh, and to continue his consultative practice. That he may do so for many years, and at the same time enjoy a well-earned freedom from the more exacting responsibilities of official life, is our sincere hope.

BY the death of Sir Thomas M'Call Anderson, which occurred with such tragic suddenness on the 26th of last month, Glasgow has lost a distinguished citizen and one of her best known physicians. Sir Thomas held the Professorship of Clinical Medicine in the University of his native city from the foundation of the Chair in 1874 until the year 1900, when he was elected to the Professorship of Systematic Medicine. In 1905 he received the honour of Knighthood, and last year he was made one of His Majesty's Honorary Physicians in Scotland. His loss will be mourned by a large circle of friends throughout the country.

ORIGINAL COMMUNICATIONS.

THE SYMPTOMS AND ETIOLOGY OF MANIA.[1]

By Lewis C. Bruce, M.D., F.R.C.P.Ed., *Medical Superintendent, Perth District Asylum, Murthly.*

Lecture I.

The physician in his dealings with disease has always the consolation of knowing that he has nature on his side. One of the most wonderful forces of nature is antagonism to disease, and when disease has gained sway her efforts to promote recovery are untiring. I have seen it stated that nature kills or attempts to kill unsuitable stock. Such a statement is opposed to the little that we do know of nature's methods. The weaker the stock the more carefully does nature lay her plans for its perpetuation. Why are the families of tuberculous parents large? Because nature is preparing for a heavy death-rate.

In a certain American State, efforts have been made to legalise the elimination of persons suffering from incurable diseases and of those physically unfit. Should such a measure ever become law, it would, I believe, defeat its own aims, because it is opposed to this great law of nature.

All the advances in medicine and surgery have been made along the lines of nature's methods of promoting recovery from disease or injury, and the retrogressions have been due to ignorance of or the ignoring of nature's methods.

When we come to study mental diseases we find that this same law holds good, and although the work of the psychiatrist is often discouraging, his course is plain—he must study nature's methods of treating these diseases, and base his treatment upon that study.

No department of medicine is more confusing or more difficult to understand than that known as psychiatry, or the study of mental diseases, because the earlier workers in the speciality have been constantly attracted along the path of morbid psychology when they should have been devoting their attentions entirely to physical symptoms. Many of our best and most original workers have drifted down this psychological path which terminates in a maze of words from which there is no escape and no possibility of advance. How many of the present-day psychiatrists affirm that the mind influences the body? Which statement followed to its logical conclusion means that the mind is something apart and distinct from the body. If this were true, then mental disease must indeed be a thing apart from general medicine, for it would not be concerned with bodily functions. Such a conclusion is manifestly absurd. All forms of energy of which we are cognisant can be demonstrated to be forms of molecular vibration, and, arguing from analogy, it is most probable that all forms of nervous energy are also merely molecular vibration. Man by means of his special senses is constantly receiving energy from without, in the form of molecular vibration, and this energy, in some way which at present we do not understand, is received, stored, and altered in the central nervous tissues, and, as education advances, we see that it is capable of being reproduced as mental energy. The proof that this must be so lies in the fact that if man were born without any special senses he would have no such thing as mind. In this and the following lectures I place mind on this simple basis, that it is a product of molecular vibration in the protoplasm of the central nervous system, and that any disorder of the mechanism or function of this nervous protoplasm may, given certain conditions, produce symptoms which we call mental disease.

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[1] Morison Lectures, delivered before the Royal College of Physicians, Edinburgh.

I am firmly convinced that if we are to advance our knowledge of the intricate mass of symptoms called at the present day mental diseases, we must attack the problem from the physical side. The mental symptoms must be to us mere incidents, nothing more, often assisting us in arriving at a diagnosis, but subsidiary and secondary to the physical symptoms which they so frequently mask, and which can only be demonstrated by direct and special investigation; investigations in which we can hope for no assistance from the patient, who, not unfrequently, is not in a state to render intelligent assistance. Speaking, however, from an experience of fifteen years' work, I have no hesitation in saying that, taking the so-called insane patients as a class, I have found them more easy to deal with than patients in general practice or in general hospitals, and that when they were in such a condition as to be able to have their condition explained to them, they most readily assisted in any means which were adopted for their treatment. As the result of work done on these lines, I propose in this and the succeeding lectures to lay before you the physical symptoms which are to be observed in that class of mental disease at present designated as conditions of mania. Wherever it is possible to do so, I will compare the symptoms in these diseases with similar symptoms, which I have from time to time been able to observe myself or collect from others, in diseases which are allied to insanity, but are rarely complicated by mental symptoms. I refer particularly to rheumatism, which, in the various forms in which it manifests itself, is closely allied to the insanities known as mania.

Mania, or states of mental excitement or exaltation, constitutes between 50 and 60 per cent. of all the admissions into asylums. Mania may occur at any period of life, but in the vast majority of cases it is a disease of adolescence or early adult life, and in this it closely resembles rheumatism (Chart 1).

The disease conditions commonly spoken of as mania may be divided into two great classes, which may be readily distinguished from one another by the mental symptoms alone. They are, firstly, mania with confusion—a state of delirious excitement in which the patient is wholly or partially unconscious of the environment, and in every case of which confusion is a marked symptom. Secondly, mania without confusion or the excitement of the *folie circulaire* type, more correctly designated on the Continent, manic-depressive insanity, from the fact that patients who suffer from this form of excitement are also liable to have attacks of depression. The excitement of manic-depressive insanity is characterised by elevation of mind, with little or no confusion. The patient keeps in touch with the environment, the special senses are hyperacute, and the chief mental characteristic of the disease is a rapid, ill-regulated, and easily disconnected train of thought. Confusional or delirious mania is a condition which, if not recovered from, is liable to pass into a chronic state of excitement, which may closely simulate the excitement of manic-depressive insanity, and still later tends to pass into a delusional condition, associated with restless excitement, destructiveness, and noise, and still later terminates in dementia more or less complete. A most interesting and instructive fact about this type of the disease is that the state of early delirious excitement may never manifest itself, the onset of the toxæmia in some cases being so gradual and insidious that the mental

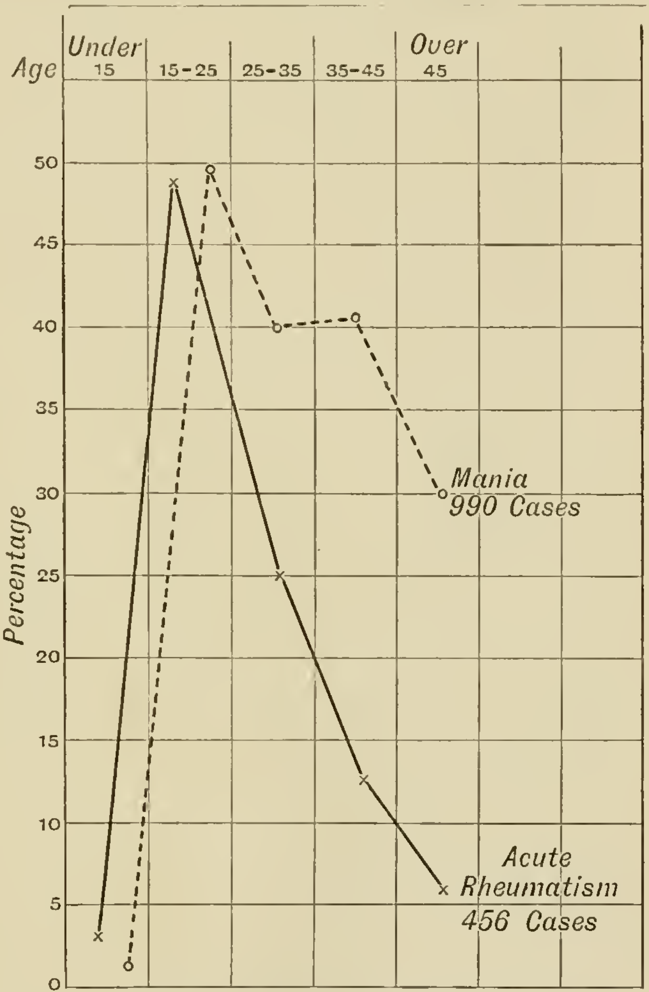


Table comparing the age of onset in MANIA and Acute Rheumatism

CHART 1.

symptoms only become evident when the patient passes into the delusional state with complete change of character, and then it is only by physical examination that the true nature of the disease can be demonstrated. But whatever its method of onset or terminations may be, mania of the confusional type is never complicated by attacks of depression, which are extremely common in the allied disease manic-depressive insanity, so common in fact as to have led to the term depressive being added to the nomenclature.

The causes of the onset of all insanities are physical, and this is particularly the case in the victims of mania. I know that you will not believe me when I say that insanity is never the result of love affairs or religious excitement, because such a statement traverses one of the most dearly cherished delusions of the laity and many professional men. Emotionalism is a symptom of an unstable brain, and after insanity evidences itself it is a symptom of the insanity just as alcholism is far more frequently a symptom than a cause. This latter statement I can demonstrate to you by several most striking cases,—cases in which I rely upon physical not psychological evidence to support my statements. Further, states of mania never arise *de novo* as the result of brain disease pure and simple. However defective any organ of the human body may be, that organ never originates disease *per se*; there must be a cause for the onset of disease, and this rule applies to the brain as well as to all other bodily organs. What, then, are these causes which make for disease of the highest nervous structures? The first and most generally accepted cause is predisposing, and is spoken of as Hereditary Predisposition. It must be clearly understood that a man never inherits actual mental disease from his parents, but he inherits a defect of constitution, which renders the most highly organised portions of his nervous system liable to attacks of disordered function from causes which would not affect a man of sound constitution. And it is not necessary that the patient should have had insane progenitors. It is sufficient that his parents, through disease, accident, or disregard of the laws of health at the period of his conception, failed to supply him with the necessary balance of mind and body which constitute the true condition of health. Further, such parental defects as alcoholism, tuberculous disease, extreme nervousness, vagabondage, eccentricity, hysteria, criminality, inequality in mental development, such as extreme brilliancy in one direction combined with deficiency in others, and any weakness of the defences of the body against toxic and bacterial invasions, may produce in the offspring as great an hereditary predisposition to mental diseases as may actual attacks of mental disease in one or both parents.

Regarded therefore from this broad standpoint, hereditary predisposition, meaning an unstable nervous system, is the great predisposing cause of all insanities.

With regard to the exciting causes, I will in these lectures confine myself to the exciting causes of maniacal states which are now very generally believed to be toxic in origin, and I go further and say that the toxins are bacterial toxins, and that the bacteria are of the class cocci and allied to the *Micrococcus rheumaticus.* It is difficult, perhaps impossible, to wholly substantiate such a statement with regard to the causation of mania on the postulates of Koch,—that to prove a disease to be bacterial, one must find the specific organism in every case, reproduce the disease in animals, and recover the organism from the diseased animal. I may say at once that I have not found a specific organism in every case, but I have found evidences of specific bacterial invasion in every case. Secondly, I have never been able to reproduce mania in the lower animals, but I have produced evidences of lesion in the lumbar enlargement of the spinal cord in rabbits, showing that the toxins of these bacteria have a chemical affinity for nerve tissues. Further, I have found that the injection of vaccines made from the organisms isolated from the cases of mania, when tentatively used as a method of treatment in such cases, produced a marked exacerbation in the symptoms of the disease if the dose of vaccine was too large. The same results follow the use of vaccines made from the *Micrococcus rheumaticus* when injected into patients suffering from rheumatism. These observations will be referred to again in a later lecture. I have demonstrated that the changes in the blood serum of infected rabbits closely resemble those which I have been able to demonstrate in man; and, lastly, a pure culture of the organism has been obtained from inoculated rabbits in one case so long as one month after infection.

There are therefore many links in the chain of evidence wanting, but such evidence as is already in my possession is sufficient to warrant the general conclusion being drawn, that the diseases known as mania are due to bacterial toxæmias, which are in many ways comparable to the bacterial toxæmias of rheumatism.

The question at once arises, If the toxæmias of mania are comparable to the toxæmias of rheumatism—a very common disease in this country—is there any evidence that the sane as well as the insane suffer from similar toxæmias? There is evidence to this effect.

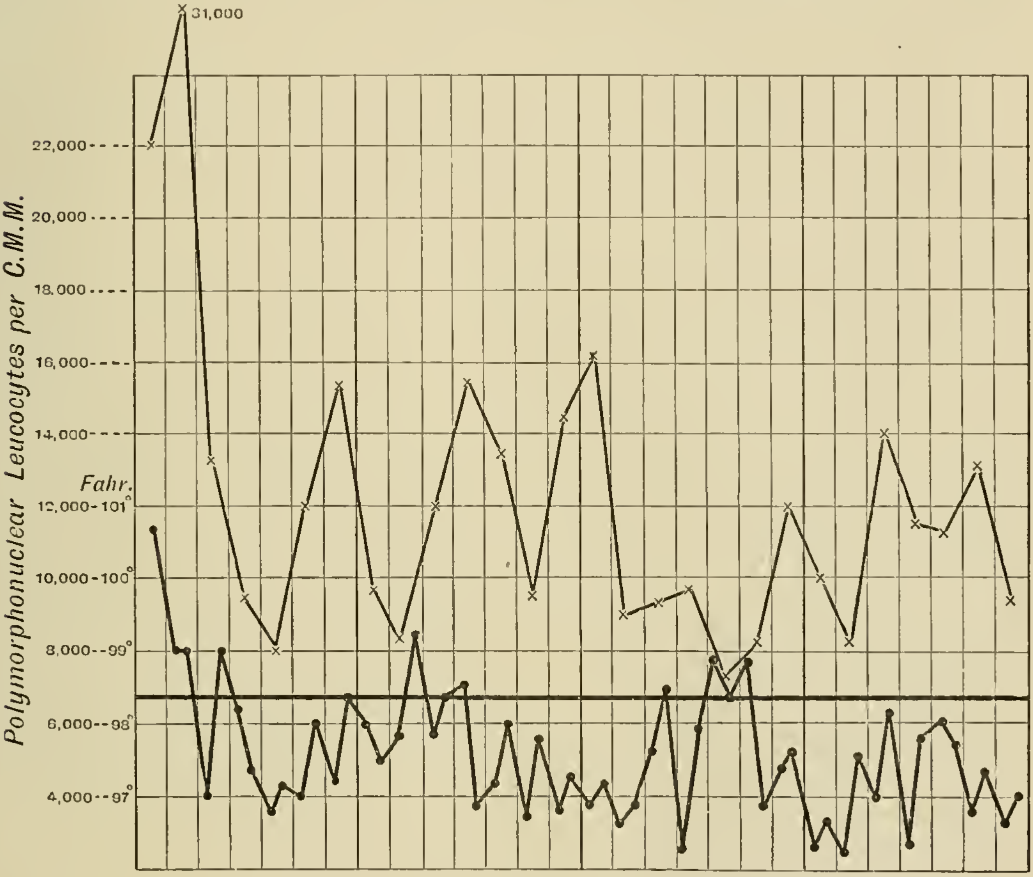
My colleague, Dr. C. J. Shaw, and myself, when working at the opsonic indices of persons suffering from insanity, which necessitated the mixing of the serum of the patients with the washed red blood corpuscles from a healthy subject, noticed that the blood serum of certain forms of insanity, particularly cases of mania whose symptoms pointed to the evidence of bacterial toxæmia, agglutinated the red blood corpuscles of healthy persons. The washed red blood corpuscles of a case of mania, on the other hand, were not affected by the serum of another case of mania, although the serum of both patients acted with vigour upon the red blood corpuscles of a healthy man. In other words, the red blood corpuscles of a person who gives this reaction are protected against the agglutinating substance.

Out of fifty-four cases of mania examined, 50, or 92·5 per cent., gave this reaction.

On further investigating this reaction, we found that it could be demonstrated in many sane patients suffering from known bacterial invasions, and my thanks are due in this respect to Drs. C. B. Ker and T. Mitchell, who supplied me with many samples of serum from patients admitted into the hospitals of which they had charge. (The washed red blood corpuscles of these sane but sick persons were also immune to the action of agglutinating sera obtained from maniacal patients.) On further extending the observation to persons supposed to be in a state of health, for instance all the members of the asylum staff and others, I found that 50 per cent. of the sane and apparently healthy gave the reaction. The washed red blood corpuscles of these persons were also immune to the agglutinating action of sera taken from cases of mania.

This reaction, therefore, although almost universal in the insane, is evidently not confined to insanity, and is not a diagnostic of insanity. In further observations I found that the agglutinating substance in the serum was thermostable, *i.e.* it still acted after being heated to 60° C. for thirty minutes. It was found that, if equal portions of normal red blood corpuscles and the serum of a person giving this reaction were mixed *in vitro,* allowed to stand for fifteen minutes, then centrifuged and the supernatant fluid pipetted off, that the pipetted serum, if not mixed with a fresh supply of normal red blood corpuscles, had no further power of action. It is clear, therefore, that the agglutinating substance is either destroyed or exhausted, or had linked itself to the normal red blood corpuscles with which it had been originally mixed.

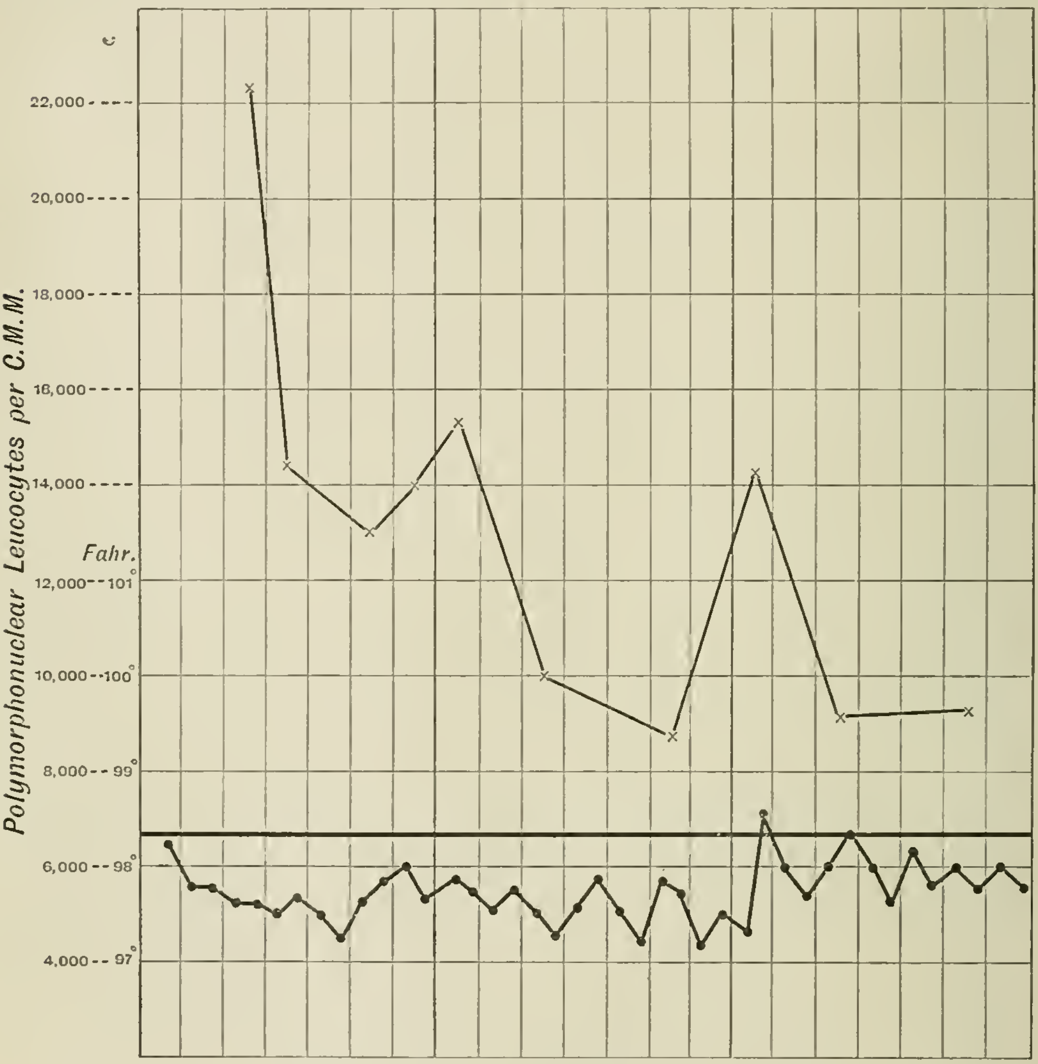
To assist in explaining this reaction, it was now necessary to attempt to reproduce the condition artificially, and this was done with rabbits. A control rabbit was chosen whose washed red blood corpuscles tested against the serum of fourteen others gave no reaction. Four of these rabbits were inoculated with a diplococcus or short streptococcus isolated from the blood of a case of acute mania of the confusional type; three with a coccus obtained from the bone marrow of a patient who died in the typhoid state during an attack of acute mania; five with a *Bacillus coli communis*; two with a *B. paralyticans*—the diphtheroid bacillus of Ford Robertson, M'Rae, and Jeffries. The serum of all the rabbits infected with the coccal organisms, as soon as agglutinins to the infecting organism could be demonstrated in the serum, also agglutinated the washed red blood corpuscles of the control rabbit. None of the rabbits infected with the bacilli gave the reaction. The agglutinin to the red blood corpuscles present in the sera of the rabbits inoculated with the coccal organisms was only present for a few days in each case, but could be reinduced by reinoculating the rabbit with the coccal organisms. From this series of observations I conclude that wherever the blood serum of one person agglutinates the washed red blood corpuscles of a person in health, that the person supplying the serum is probably suffering from a coccal invasion. It is true that many of the persons who gave this reaction were apparently healthy, but so far as I was able to go into the physical state of such persons, my belief is that many of them were not in a state of health. Many of the women were suffering from anæmia or chlorosis, others had recurrent attacks of tonsillitis. Two of the sane persons who gave this reaction at a later date contracted typhoid fever and both suffered severely, not so much from the typhoid as the sequelæ of typhoid, and convalesced slowly, while a third contracting pneumonia died after forty-eight hours' illness.



Temperature & Polymorphonuclear Leucocyte Chart
MANIA (Confusional Type)

CHART 3.

If, then, the sane with the insane show evidence of bacterial toxæmias, we are driven back to the constitutional taint, the inheritance of an unstable nervous system as the chief factor in the production of mania. That is to say, the sane and the insane may suffer from similar toxæmias, but as the brain of the sane man is stable, the toxins produce no mental symptoms, while the brain of the insane man is unstable and readily becomes disordered by toxic action. Further, it is probable that the subjects of mania have also a constitutional failure in their bacterial defences. Dr. C. J. Shaw, my late colleague, demonstrated most clearly the fact that patients suffering from acute insanity, particularly cases of acute mania, have a lower resistive power to the tubercle bacillus, as gauged by the opsonic index, than sane persons of the same age, and yet several of his control cases gave the agglutinative reaction with the red blood corpuscles of a healthy



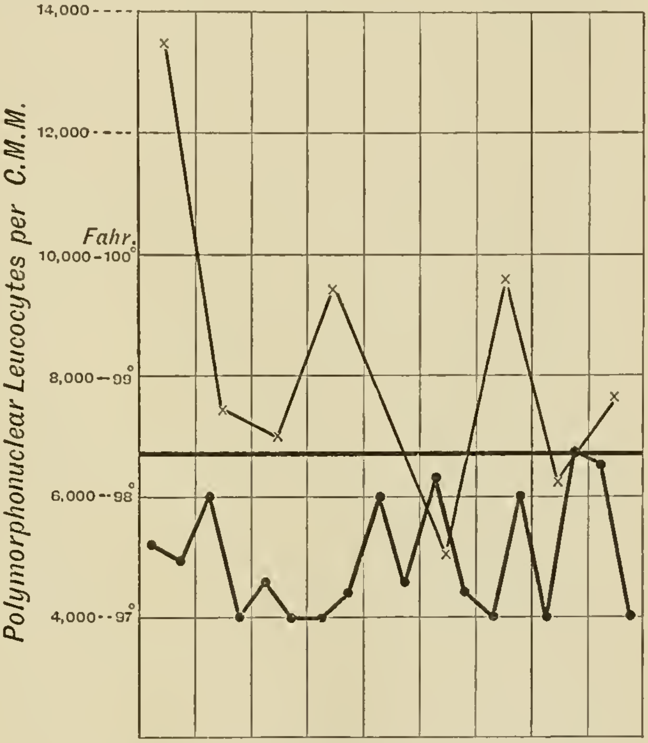
Temperature & Polymorphonuclear Chart
MANIA (Confusional Type. Chronic) ×○

CHART 5.

man. When the resistive power of these maniacal patients, as gauged by the opsonic index, was tested to the *B. coli communis*, the *Staphylococcus aureus*, and to two varieties of streptococci, it was found to be lower that the average index obtained in the control cases.

Turning then from the causes of mania to the physical symptoms of the disease, I show two charts of the body temperature in cases of mania with confusion and mania of the manic-depressive type respectively (Charts 3 and 4).

It will be noticed at once that there is practically no febrile reaction in either case, and yet the synchronous polymorphonuclear leucocyte record is a most marked departure from that of health. We have on these charts a graphic representation of a marked toxæmia without any corresponding rise in the body temperature,—a state of affairs which until a few years ago was considered an impossibility. Repeated observations on similar cases, however, have proved this fact beyond doubt, that in cases of mania such conditions as a virulent toxæmia and an afebrile temperature coexist. There is also a temperature and leucocyte chart (Chart 5) in two cases of mania with confusion which never developed excitement, but in whom a gradual mental change took place. They changed in character, became slightly confused, irritable and, delusional, and judged by their mental symptoms, might have been regarded as cases of delusional insanity. The physical symptoms, however,—the leucocytosis, the presence of bacterial agglutinins in the blood, and the discovery of a local uterine lesion in each case,—leave no doubt as to the diagnosis. These two cases, which are both of peculiar interest, will be again referred to when the blood changes are described. Chart 6 (*a*) is shown, so that the temperature and leucocytosis in a case of sub-acute rheumatism may be compared with those of cases of mania.



Temperature & Polymorphonuclear Chart
Sub-Acute Rheumatism

CHART 6 (*a*).

The alimentary system in all forms of mania is in the early stages of the disease disordered. The lips, teeth, and tongue readily become covered with sordes, and over 90 per cent. of the patients admitted to the Perth District Asylum had carious teeth. The theory has been advanced that carious teeth alone may, in a predisposed person, produce such a condition of toxæmia as to induce an attack of mania. I have seen cases in which the history of onset strongly supported this view. If one considers the absorptive capacity of the mucous membrane of the mouth for such toxins as nicotine, it is reasonable to suppose that the bacterial toxins produced by carious teeth will be absorbed with equal readiness. We make a point of removing all carious teeth in our maniacal patients, and the physical and mental improvement which follows such a procedure suggests that the toxins arising from carious teeth may well act as an accessory cause of toxæmia in such cases. It is a popular belief that the bite of an insane person is particularly poisonous, and, like many popular beliefs, there is in this a substratum of truth. When we come to examine the bacteriology of the saliva, we find that the organisms are extremely numerous in the saliva, particularly in cases of confusional mania. I show by lantern slide tubes of nutrient media which have been inoculated from the saliva of such a case, and also a tube inoculated from the saliva of a man in health. It will be noticed that the characters of the growths vary considerably; the colonies being more numerous, larger, and more uniform in the tube inoculated from the saliva of the case of mania than in that inoculated from the sane person. Before these cultures were made the maniacal patient had had all carious teeth removed (Chart 7).

The digestive power of the gastric juices during attacks of acute excitement is practically in abeyance, but this is followed later by great digestive activity. In a state of health the gastric juice has a powerful bactericidal action. In states of mania, however, this action is sometimes deficient. From the stomach contents of several such patients I have isolated cocci which were extremely virulent to rabbits. The same remark applies to some of the organisms isolated from the saliva; whereas the organisms which I have isolated from healthy saliva are not toxic to rabbits even in large doses. It is possible, however, that these virulent organisms found in the stomach contents of cases of mania had been carried from the mouth to the stomach by means of the stomach tube used to extract the stomach contents.

The digestive and assimilative power of the small intestine is probably also deficient, as maniacal patients, even if fed artificially with an abundant supply of nitrogenous food, continue to lose weight rapidly.

One further fact regarding the bacteriology of the intestinal tract may be touched upon here. If stroke cultures are made upon agar tubes from the fæces of man or the lower animals, the resulting growth of the *B. coli communis* is so great that all other organisms are obliterated. In over 50 per cent. of the cases of mania whose fæces were examined in this way, I was struck by the fact that the *B. coli communis* was not present in great numbers, and that colonies of cocci were numerous. For instance, six agar tubes were inoculated from the fæces of a case of recent and acute confusional mania, and in none of the tubes was a single colony of the *B. coli communis* to be detected. The only organisms present being streptococci. I have had a lantern slide made from tubes inoculated from the fæces of a case of mania, which will demonstrate much more clearly to you this peculiar change in the bacterial flora of the intestinal tract. Out of twenty-seven cases of mania in whom the fæces were bacteriologically examined, fifteen showed this peculiarity. The patients during the period at which these observations were made were being fed on milk and farinaceous food.

The circulatory system with its complicated nervous mechanism reacts very readily to the toxins circulating in the blood of maniacal patients. The heart's action is, I believe, always affected centrally, that is to say the toxins act upon the cardiac centres. Valvular lesions are stated to be more common in the insane than the sane, but the symptoms which have attracted my attention most are the attacks of syncope, sometimes fatal, to which maniacal patients are liable, and the rapid irritable pulse rate which precedes and follows, particularly attacks of mania with confusion. During the actual period of acute excitement, the pulse rate is largely affected by the excessive movements of the patient, but before and particularly after maniacal attacks the pulse rate is a most valuable indication of the state of health. I have repeatedly seen patients, apparently recovered, with a pulse rate varying between 90 and 120 per minute, and so long as such a symptom persists the patient is most liable to a relapse if great care is not taken. My rule is never to allow a maniacal case out of bed so long as the pulse rate is above 70 per minute.

The arterial tension is also altered in these cases. Maurice Craig states that the arterial tension is always low in maniacal states. This is partly true, but at the onset of acute excitement the arterial tension frequently rises. The chart thrown upon the screen shows the arterial tension of an adolescent male just at the onset of an acute maniacal outburst. The readings were taken with a Barnard and Hill's sphygmometer, and it is seen that in the course of sixteen minutes the mercury rose from 130 to 150 mm.

Observations on the urinary excretion are interesting in so far that they demonstrate that maniacal states are very similar to febrile conditions, in the fact that the nitrogenous waste products of the body are greatly in excess of the nitrogen ingested in the food, and in that the excretion of the chlorides in the early stages of the illness is greatly diminished. In estimating the nitrogenous output I used Southey's ureometer, and in calculating the nitrogenous ingestion I relied upon standard physiological tables of the nitrogen value of various food stuffs; the quantity of food which each patient took being carefully recorded at each meal. A certain amount of error can hardly be avoided in using such a method, but the results obtained throughout a series of observations which extended over two years were so uniform, that even admitting of error I submit that the records so obtained are of clinical value.

We were able to examine the urine in twenty cases of mania of all varieties. The longest observation extends over a period of six months, and the shortest for fourteen days. In many cases the records were intermittent, as delirious patients often pass urine involuntary, but even intermittent records when supplemented by complete ones are of value, and the result of the whole series of observations amounts to this, that during the early days of the illness the excretion of urea-nitrogen is far in excess of the urea-nitrogen value of the food ingested, and during this period the patients steadily lose weight. Then follows a stage when the nitrogen ingested and the nitrogen excreted balance and the weight remains stationary. This is followed by the period of convalescence, when the urea-nitrogen excreted is far below the amount of urea-nitrogen value of the food ingested, and during this period the patient gains weight. The termination of convalescence is marked by stationary weight and a return of the balance of the nitrogen excreted and the nitrogen ingested in the food.

The charts[1] thrown upon the screen demonstrate this more clearly than any verbal explanation (Chart 9).

Chart 9 shows the urea excreted, the urea-nitrogen value of the food ingested, and the weight in lbs. in the case of a male adolescent suffering from mania of the confusional type. During the first week the urea excreted averaged 475 grs. per day as against 225 grs. of urea-nitrogen value in the ingested food. The weight decreased 5 lb. For the next five weeks the urea excreted and the urea-nitrogen value of the food ingested ran parallel. The weight remained stationary. During the seventh week of the illness the urea excreted was only 400 grs. per day as against 500 grs. of the urea-nitrogen value of the food ingested. There was a corresponding increase in weight. From the seventh to the sixteenth weeks the patient was in a state of lethargy, frequently wet, and the record was broken. During the sixteenth, seventeenth, eighteenth, and nineteenth weeks the urea excreted remained below the level of the urea-nitrogen value of the food ingested, and the weight increased from 135 lb. to 152 lb. For the next two weeks the excretion and ingestion balanced, and the weight remained stationary.

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[1] Owing to exigencies of space, it has only been possible to reproduce one chart as a typical illustration.

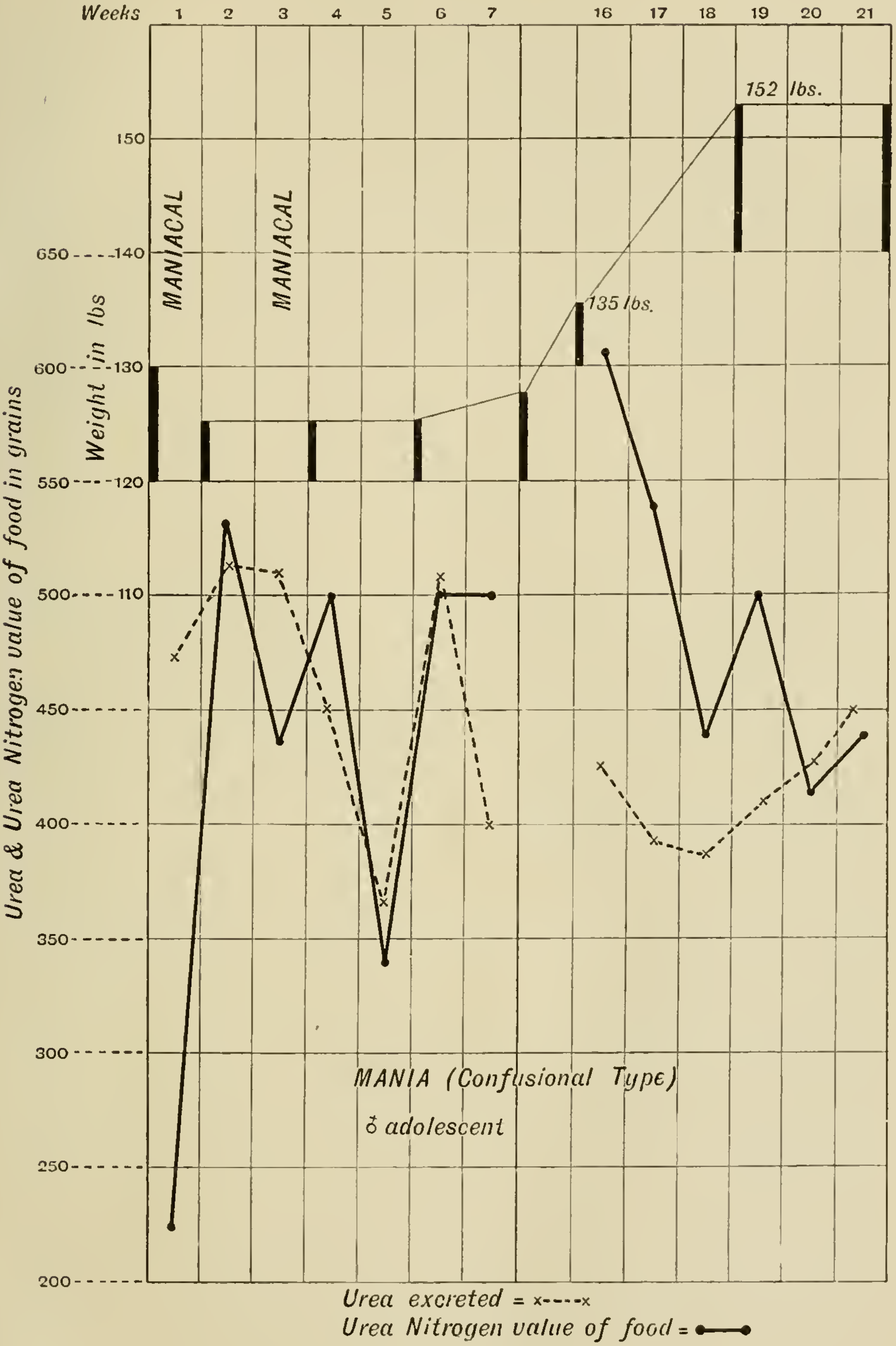

CHART 9.

Chart 10 shows the urea excreted, the urea-nitrogen value of the food ingested, and the weight in lbs. in the case of a male adolescent suffering from mania of the manic-depressive variety.

For the first three weeks the nitrogen excreted was constantly in excess of the nitrogen ingested, and there was a loss in body weight. During the fourth and fifth weeks the patient was wet. During the sixth, seventh, eighth, ninth, tenth, and eleventh weeks the nitrogen excreted and ingested fluctuated. During the twelfth, thirteenth, fourteenth, fifteenth, and sixteenth weeks the nitrogen excreted was less than the nitrogen ingested, and there was an increase in weight.

Chart 11 shows the urea excreted, the urea-nitrogen value of the food ingested, and the weight in lbs. in the case of a female adult suffering from mania of the confusional type.

The acute stage of the disease lasted for one week, during which the average daily urea-nitrogen excreted was 320 grs. as against 190 grs. of the urea-nitrogen value of the food ingested. The weight fell 5 lb. During the second week the nitrogen ingested and the nitrogen excreted practically balanced. During the third and fourth weeks the nitrogen excreted was far below the nitrogen ingested in the food, yet the weight remained stationary. During the fifth week the excretion and ingestion of nitrogen balanced.

Chart 12 shows the urea excreted, the urea-nitrogen value of the food ingested, and the weight in lbs. in the case of an adult female suffering from mania of the manic-depressive variety.

During the first two weeks of the illness the excretion of nitrogen was far in excess of the nitrogen ingested in the food, and there was a loss in weight. During the succeeding five weeks the excretion and ingestion practically balanced one another. The weight slightly increased.

Summary of Lecture I.—1. It is a commonly accepted belief that maniacal states are conditions of brain toxæmia or brain poisoning.

2. It is also commonly accepted that hereditary predisposition is the chief predisposing cause of all insanities.

3. As to the exciting causes of mania, there are evidences of bacterial toxæmia—(*a*) In the blood serum of over 90 per cent. of patients suffering from mania, one can demonstrate the presence of an agglutinin which agglutinates the red blood corpuscles of healthy persons. An apparently similar agglutinin is present in the blood serum of many sane and apparently healthy persons. By infecting rabbits with streptococcal and staphylococcal bacteria, a similar agglutinin makes its appearance in the blood serum of the infected rabbits. The presence of such an agglutinin in the blood serum would therefore apparently indicate some form of streptococcal or staphylococcal invasion. As both the sane and the insane may show this symptom of bacterial toxæmia, there must be some further factor in the production of states of mania, and this further factor is probably an inherited or acquired

unstable nervous system. In other words, the sane and the insane may suffer from similar toxæmias, but whereas the brain of the sane man is stable the toxins produce no mental symptoms, while the brain of the insane man is unstable and readily becomes disordered by toxic action. (*b*) Although the bodily temperature shows little evidence of toxic disorder, a simultaneous observation of the white blood corpuscles of the patient demonstrates that a state of marked toxæmia exists in nearly every case. (*c*) The disorders of the alimentary tract are such as one would expect to find in persons suffering from toxic diseases. Further, the bacteriological flora of the whole alimentary tract is altered in at least 50 per cent. of the subjects of mania. (*d*) Lastly, the nitrogenous excretion by the urine in the subjects of mania indicates an excess of metabolism similar to that found in known infective diseases.

LECTURE II.

The substance of my last lecture was that the mental diseases known as mania are, when examined from the physical standpoint, somatic diseases. The changes to be noticed in the alimentary, the circulatory, and the urinary systems are such as to point to the causal factors being toxic in nature, and probably bacterial in origin. To-day, by a description of the changes to be found in the solid and liquid constituents of the blood, further light can be thrown upon the obscure causation of the various forms of mania.

The blood serum in a state of health contains certain antibacterial substances, amongst others agglutinins and opsonins. The action of the agglutinins can be readily demonstrated *in vitro*. If the serum of a healthy man be mixed with a broth culture of the *Staphylococcus aureus* in the proportion of 1 part of serum and 19 parts of broth, and the mixture be examined under the microscope, it will be found that the cocci are agglutinated, generally within thirty minutes. The rapidity and the completeness of agglutination varies in different persons, and the serum of any given person varies in its agglutinative power from day to day. In twenty members of the asylum staff who were examined as controls, this staphylococcal agglutinating substance was present in every case. Similar agglutinins which act upon many of the streptococci can be demonstrated in the serum of healthy persons.

In addition to these normal agglutinins, the blood may contain agglutinating substances directly the result of disease. We know, for instance, that in typhoid fever, a disease due to a specific bacillus, the blood serum contains an agglutinating substance which acts only upon the typhoid bacillus, and we also know that this agglutinin is rarely present in persons who have never been infected with typhoid. Since Grünbaum and Widal made this discovery, other observers have recorded the presence of specific agglutinins in the blood serum of persons suffering from such conditions as Malta fever, *B. coli* infection, etc.—conditions, in short, where the organism causing the disease can be isolated from the patient and grown artificially. It is evident, therefore, that if in any patient suffering from an obviously toxic disease, one can demonstrate the presence in the serum of a specific agglutinin to an organism which has been isolated from that patient or another suffering from a similar disease, which agglutinin is not found in the serum of persons in a state of health, this fact alone is suggestive that the patient is suffering from, or has recently suffered from, bacterial invasion by the organism which the blood serum agglutinates. In certain disease conditions, such as typhoid, the demonstration of the presence of a specific agglutinin in the blood serum to the typhoid bacillus is enough to clinch the diagnosis in a doubtful case. There are, however, certain organisms, particularly of the streptococci group, whose behaviour when mixed with serum is so uncertain that some workers go the length of saying that no reliance can be placed upon results based upon such observations as streptococcal agglutination. The fact that agglutinating substances to many of the streptococci group of organisms normally exist in the serum of healthy persons has apparently complicated this line of research. While admitting the difficulty to be encountered, and the errors which may occur in such work, I have no hesitation in saying that specific agglutinins to certain of the streptococci group can be demonstrated in the blood serum of patients suffering from mania, and that this agglutinin is very rarely present in the serum of apparently healthy subjects, or in the subjects of mental diseases other than states of mania.

Some four years ago I isolated from the blood of a case of mania of the confusional type, in a typhoid state, a short streptococcus. The patient recovered, and out of curiosity I tested the blood serum of the patient to a broth culture of the organism in a dilution of 1 in 30, and agglutination was complete in thirty minutes. I found that agglutination occurred in dilutions of 1 in 100, but the reaction was slower. The sera of two control cases failed to give a reaction after twelve hours. Since then I have tested the serum reactions of some 204 patients suffering from all varieties of mental disease to this streptococcus. Ninety-three of these patients laboured under either one or the other of the two varieties of mania mentioned in the first lecture. Over 70 per cent. of these patients gave a definite agglutinative reaction. Of the 101 patients who suffered from mental diseases other than mania, only 10, or 9·8 per cent., gave agglutination. Further observations upon the bacteriology of patients suffering from mania yielded some five other strains of streptococci very similar to that isolated from the blood of the case previously mentioned. By using all the strains of streptococci thus obtained in these agglutinin observations, I found that the presence of a specific agglutinin could be demonstrated in the serum of nearly every case of mania. If one calls the members of the asylum staff and all the mental cases not maniacal in character, controls, then agglutination to one of the six varieties of streptococci was only obtained in twenty out of 126 cases, or 15·8 per cent.

Another interesting point is that over 60 per cent. of the maniacal patients were deficient in the normal protective agglutinin to certain strains of the *Staphylococcus aureus*, which agglutinin appears to be always present in healthy serum. My observations upon the leucocytosis in insanity have already been recorded, but as the present lecture would not be complete without reference to this branch of the investigation into the symptoms of mania, and as later observations have placed further interesting facts in my possession, I will describe the leucocytosis in mania as briefly as possible.

Before recording the white blood corpuscle or leucocyte changes which occur in the blood of patients suffering from the various forms of mania, it is necessary that I should shortly lay before you the present accepted views regarding the forms and the numbers of these cells which are to be found in healthy persons.

The leucocytes or white blood corpuscles, according to recent observations, vary in health between 5000 and 10,000 per c.mm. of blood. They often exceed 10,000 in women with a tendency to anæmia, and every now and then one encounters an apparently healthy person with a leucocytosis averaging 12,000 or 14,000 per c.mm. In some of these cases, however, one finds a cause for the hyper-leucocytosis unknown and unsuspected by the patient.

The leucocytes consist of at least six varieties of cells:—

1. The multinucleated leucocytes with neutrophile granules, commonly spoken of as polymorpho-nuclear leucocytes, or shortly as polymorphs. These cells are relatively and actually increased in many known diseases due to bacterial invasion, and now, when making a leucocyte count, it is recognised that it is more important to know the actual number of the polymorpho-nuclear leucocytes per c.mm. than to know only the number of leucocytes in a c.mm. The actual number of polymorpho-nuclear cells per c.mm. in eight control persons examined varied between 7000 and 2500, and the average in these persons was 4829. All the charts which will be shown to-day are based on this system of calculating the polymorphs per c.mm. These cells are actively phagocytic in function. They increase in the blood prior to the appearance of agglutinins, opsonins, and immune bodies in the serum, and it is probable, therefore, that they are glandular cells which secrete these substances.

2. The small lymphocyte.
3. The large lymphocyte.
4. The hyaline or mononuclear cell.

These three varieties tend to run into one another, and their relative proportion in leucocyte counts is affected by the personal equation of the observer. Their functions are but little understood beyond the fact that the large lymphocytes and hyaline cells are actively phagocytic.

5. The eosinophile leucocyte,—a binucleated or multinucleated cell with large eosinophile granules. These cells increase in the blood during convalesence from some bacterial invasions, and are frequently increased after injections of bacterial vaccines. They become actively and selectively phagocytic after injections of bacterial vaccines, and it is probable that they also secrete some of the protective anti-bacterial substances. In the control cases they never exceeded 300 per c.mm. of blood, and I regard anything over 400 per c.mm. as abnormal.

6. The mastellan leucocyte or mast cell,—a leucocyte with a single, lobed, or double nucleus, the surrounding protoplasm containing large violet granules when stained by Jenner's stain. Their function is unknown.

During the last four or five years I and my assistants have examined the leucocytosis in thirty-six cases of mania or the manic-depressive type, and thirty-one cases of mania of the confusional type. The observations made upon these patients were continuous, extending in some cases for periods of over six months in each case. Isolated observations are practically valueless in throwing light upon these obscure disease conditions. Taking the average polymorpho-nuclear leucocytosis as 7000 per c.mm., we have found a hyper-leucocytosis of these cells in every case of mania examined.

(*To be continued.*)

DEATHS FROM GASTRIC AND DUODENAL ULCER AFTER OPERATION FOR OTHER CONDITIONS.

By Alexis Thomson, F.R.C.S.Ed., *Assistant-Surgeon to the Royal Infirmary, and Surgeon to the Deaconess Hospital, Edinburgh.*

Chronic ulcer of the stomach and duodenum has succeeded infective lesions of the appendix as the most interesting example of the advance of clinical surgery in recent times. Its remarkable features, its importance as a cause of suffering, and not infrequently as a cause of death, and its amenability to treatment by surgical means, are now well known to those engaged in hospital practice, and are becoming better known every day to the profession as a whole. While there is probably no abdominal lesion which, when exhibiting its characteristic features, can be diagnosed with greater certainty, there are few morbid conditions which, in the latent state, are so liable to escape recognition, and which demand therefore a detective-like watchfulness on the part of the practitioner.

It appears worthy of record that during the past year it has happened to Mr. Caird, Mr. Dowden, and myself, to have operated upon patients—in one case for sarcoma of the upper jaw, and in the remaining two for the enucleation of an enlarged prostate—in whom the lighting up of an unsuspected ulcer of the stomach led, in the course of an apparently satisfactory convalescence, to an unexpected and rapidly fatal termination.

Case 1.—*Sarcoma of the upper jaw, excision; death from hæmorrhage from gastric ulcer.* (For the notes of this case I am indebted to my colleague, Mr. F. M. Caird.)—The patient, a farmer, æt. 32, had suffered for one year from a mass of mucous polypi blocking the left nostril, and for seven months from inconvenience and pain due to a tumour of the left upper jaw. Previous to the above he had suffered for two years from indigestion, in the form of pain coming on half an hour after meals, which lasted for one to two hours, and was relieved by vomiting, but of late there have been no symptoms directing attention to his stomach.

On the 29th March 1907, under chloroform anæsthesia, and after preliminary tracheotomy, and the placing of a temporary ligature on the left common carotid, the whole upper jaw and affected parts on the left side were removed; the tumour being found on examination to be a sarcoma of alveolar structure. On the 4th, 5th, and 6th of April there was considerable cough and other symptoms of broncho-pneumonia at the left base, and on the last date an enema brought away a large motion, with a quantity of tarry material. There was no sickness or vomiting, and no tenderness or rigidity of the abdomen. On the 7th he became extremely pallid, and showed other signs of internal hæmorrhage, and there was a quantity of dark blood in the motions. He died on the morning of the 8th.

The report of the post-mortem examination showed that the operation wounds had healed well; the stomach was full of recent blood clot; a small oval ulcer was found on the posterior wall near the lesser curvature, one and a half inches above the pylorus; it had a punched-out appearance, the edges being undermined and passed down to the muscular coat. Near the centre was the open mouth of a vessel, from which the hæmorrhage had evidently proceeded.

Case 2.—*Suprapubic prostatectomy; death on the tenth day from hæmorrhage from duodenal ulcer.* (For the notes of this case I am indebted to my colleague, Mr. J. W. Dowden.)—A stout, healthy-looking man, æt. 68, had suffered for two years from frequency and difficulty of micturition, and since an attack of complete retention in May 1907 had been almost entirely dependent on the catheter. On rectal examination, the prostate was felt to be soft and as large as a Tangerine orange. Suprapubic prostatectomy was performed on the 23rd May 1907, and his progress was uneventful until the 30th, when he had a slight rigor; the temperature reaching 100°·2 and the pulse 88. On the 1st of June he was well and lively, the pulse rate being 78, and the general and local condition left nothing to be desired, but in the evening he became restless, and the temperature rose to 101° and the pulse to 100. On the morning of 2nd June the temperature had fallen to normal; but he was more restless; the pulse was 116; the skin was pale and moist, and he presented all the appearances of the bloodless state. He passed a large tarry stool the following morning, and vomited pints of coffee-ground material. He died on the afternoon of the same day, another tarry stool being passed shortly before death.

There was no post-mortem examination, but Mr. Dowden was of opinion that death was due to loss of blood resulting from the lighting up of a long-standing duodenal ulcer.

CASE 3.—*Subrapubic prostatectomy; death on the sixth day from perforation of duodenal ulcer.*—The patient, a merchant, æt. 72, had suffered for some years from disturbance of his urinary functions, and twelve months ago he had a severe attack of hæmaturia, with such abundant clotting of blood in the bladder that he was unable to pass water for something like twenty-four hours. He was quite free from this until three or four weeks before the operation, when there was a little bleeding every day, but sometimes the urine was coloured like Burgundy, and contained clots. On rectal examination the prostate was soft and greatly enlarged.

Prostatectomy was advised on account of the hæmorrhage and the risk of retention of clots within the bladder, and this opinion was confirmed on consultation. The operation was performed on the 29th November 1907, a mixture of chloroform and ether being given by Dr. J. D. Luke. In the recess behind the process there was found a strand of clot about a couple of inches long, encrusted with masses of phosphates. The prostate shelled out easily and came away in three portions, one of these corresponding to a very large projecting median lobe. There was comparatively little hæmorrhage at the time of the operation, but there was a good deal of oozing through and alongside the rubber drainage tube during the day. An hour after the operation, when he was warm in bed and sleeping quietly, he suddenly collapsed, with acute pain referred to the upper part of the abdomen, and he seemed to be at the brink of death, but after the introduction of a large quantity of hot salt solution into the colon, he revived. Throughout the rest of the day an anxious feature was the recurrent vomiting of brown-coloured fluid, and this continued through the night, and was present in the morning, although to a less degree. During the ensuing days his condition was satisfactory, although he still complained of soreness and uneasiness about the upper part of the abdomen, which was attributed to the strain of vomiting. On the fifth day, at 7.20 P.M., after an hour's sleep, he turned over on his right side, and suddenly screamed aloud with pain in the upper abdomen, and tossed about the bed. The severe pain continued for three-quarters of an hour, by the end of which time he was collapsed, cold, and perspiring. When I saw him at 11.30 he was still in a state of collapse, and complaining of pain in the epigastrium, and extending down the right side of the abdomen and in the loin, and I remarked that the phenomena were those of perforated duodenal ulcer, except that there was no rigidity of the abdominal wall. The question of operation was considered, but decided in the negative as being in all likelihood beyond his powers of endurance. At 1 A.M. he brought up 4 oz. of brown fluid. He was given repeated injections of morphine for relief of the pain, and he sank and died at 9 A.M. on the sixth day after the operation.

On opening the abdomen after death, there was a large amount of green-stained, thick fluid extending from the epigastrium down the right side of the abdomen into the pelvis; there was scarcely any gas and very little fibrinous exudate. It was with great difficulty that the first part of the duodenum was exposed, and on the right lateral wall just beyond the pylorus there was found a recently perforated ulcer of the usual chronic type. On opening the duodenum, two additional ulcers were found in close proximity to that which had perforated.

It then transpired, on questioning his relatives, that since the age of 40 he had complained greatly of painful indigestion, the pain being referred to the epigastrium and between the shoulders—sometimes coming on after meals, sometimes before them. For many years he had suffered from acidity, for which he took large doses of bicarbonate of soda. His son, a medical man, informed me that fourteen or fifteen years ago he had had a severe hæmorrhage from the bowel, and fainted. For the last twelve months, as I myself knew from direct questioning, he had not suffered at all from his stomach; he had been taking his food well, he was very well nourished, and was quite able for his business and for golf and other pursuits, thus showing a vigour considerably above the average in a man of his years.

These cases resemble one another in that, in the course of an apparently satisfactory convalescence from an operation, a fatal termination was brought about by the lighting up of an unsuspected gastric or duodenal ulcer. It is unlikely that such a coincidence is very rare, but we have not been able to discover the record of any similar cases in surgical literature. With regard to those which form the subject of this paper, there are one or two questions which call for consideration. In the first place, it may be suggested that the ulcer might have been diagnosed beforehand, and the proposed operation might not have been carried out. In only one of the cases were symptoms suggestive of a gastric or duodenal ulcer brought out in the clinical history, and in only one of the remaining two was it possible to get a history of such symptoms subsequent to the occurrence of perforation. In Mr. Dowden's case there was no history of gastric trouble; in Mr. Caird's case and in my own, there had been a complete freedom from symptoms for a considerable time preceding the operation, so that, if even a diagnosis of pre-existing ulcer had been arrived at, the inference would have been made that the ulcer had either undergone cure or passed into a condition of latency, when little importance would have been attributed to it in considering the operative treatment of some urgent lesion elsewhere in the body. We can imagine a case in which the question between palliative treatment and radical operation might hang in the balance, in which case the knowledge that the patient had previously suffered from gastric or duodenal ulcer might determine the decision against radical operation, but in the case of a malignant tumour in the jaw or of an enlarged prostate causing symptoms dangerous to life, we do not think that the knowledge that the patient had suffered in former years from symptoms pointing to gastric or duodenal ulcer would have influenced the decision which was arrived at.

Further, it may be asked, to what extent was the operation responsible for the lighting up of the latent ulcer, and if responsible, could this have been avoided by modifying the technique of the operation? These questions are very difficult to answer.

We are as yet ignorant of the conditions which cause a symptomless ulcer to suddenly eat into the deeper coats of the affected viscus and cause hæmorrhage or perforation. In reviewing my own cases of gastric and duodenal ulcer, I have rarely been able to determine the factors which caused the ulcer to take on aggressive qualities. I do not mean to say that I have never observed prodromal symptoms, and especially what may be called threatenings of perforation, but I have seen a considerable number in which serious hæmorrhage occurred suddenly, without rhyme or reason, and I have been called to several cases in which the sudden pain of perforation wakened the patient after a normal night's rest, and it may be after a long spell of freedom from symptoms and abstention from any kind of gastric indiscretion.

We cannot, however, altogether exonerate the operation as a factor in disturbing the quiescence of a chronic ulcer when the operation is followed by retching and vomiting, whether induced by a general anæsthetic, by morphia or other drug, and this possible relationship of cause and effect may be more readily appreciated in the case of individuals who vomit with great stress and difficulty.

In the third of the cases here recorded there was repeated and violent retching and vomiting for twenty-four hours after the operation, and it is quite possible that this had something to do with the lighting up of the ulcer, or at least of one of them, for at the examination three chronic ulcers were found, and one of these had perforated. Whether in prostatic cases the patient might not be safely tided through a major operation by employing spinal anæsthesia and withholding drugs which tend to nauseate, such as morphia, is a difficult question to answer, but another argument is added to those which have already been urged for the avoidance of a general anæsthetic in severe operations when other means of inducing anæsthesia are available, and especially in cases where there is a history of symptoms suggesting the possibility of a gastric or duodenal ulcer.

THE VALUE OF LEUCOCYTE EXAMINATION IN SUPPURATIVE CONDITIONS ARISING FROM MIDDLE EAR INFECTION.[1]

By John M. Darling, M.A., M.B., F.R.C.S.Edin.

While considerable attention has been directed during recent years to the value of leucocyte examination as an aid to diagnosis, the question of its value to the aural surgeon has been somewhat neglected. In this paper are detailed the results of examination of the leucocytes in a number of patients who were under treatment for suppurative middle-ear disease in Dr. Logan Turner's Department, with or without complication, during the sixteen months—September 1906 to December 1907. Although the number in each class is not large, the cases have been selected with the object of estimating how far leucocyte examination might be an aid to diagnosis in these conditions, and how far the question of operation or no operation might be influenced by the results of such examination.

In other localised inflammatory conditions—notably in the abdomen, thanks to the investigations of such men as Hayem in connection with pelvic peritonitis, and Cabot and Da Costa in appendicitis—the surgeon is often enabled to derive from estimation of the leucocytes valuable information as to the virulence of the infection, the extent of the disease, and the necessity for operation. The object of this paper is to determine how far an examination of the leucocytes may furnish reliable indications for operation in the complications of middle-ear suppuration.

Pathological Changes in the Middle-Ear Cavity.—For a thorough appreciation of the clinical features of the conditions under consideration, it is necessary to have clearly before us a general idea of the pathological changes met with. Frederic E. Sondern states that suppurative bone lesions and suppurative processes on the surface of mucous membranes show comparatively low leucocyte counts, probably on account of slower toxic absorption. Now, we have in the middle ear a membrane lining a bony cavity. This membrane is liable to a microbic infection which sets up in it all the classical train of phenomena of inflammation. The inflammation may pass on to suppuration, and sooner or later there may be a perforation of the tympanic membrane and a certain amount of drainage established. At this stage, the process may follow one of three courses:—Firstly, it may subside entirely and allow a return to the normal; secondly, there may be an extension to adjacent structures; thirdly, the acute condition may pass off and give place to chronic suppuration. In the event of the second course arising, there may be an extension to the bony walls of the middle-ear cavity, setting up inflammation, caries, and necrosis of the bone. The mastoid antrum and cells may become infected and mastoid suppuration ensue. Or, infection may be carried within the cranium and give rise to extradural abscess, brain abscess, meningitis, or lateral sinus thrombosis. Should, however, the process become chronic, the condition diminishes in severity and degenerates into a chronic suppuration, causing in the structure of lining membrane and bone slow changes which are liable at any time to spring into renewed activity and bring about a rapidly progressing destruction of tissue. Are we able to gather any indications from leucocyte examination as to which of the three courses any particular case is following, and as to how far it has progressed?

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[1] From the Ear and Throat Department, Royal Infirmary, Edinburgh, under the charge of A. Logan Turner, M.D.

General Significance of the Results of Leucocyte Examination.—Leucocyte examination, from the surgeon's point of view, consists in the investigation of three points:—First, the number of leucocytes in one cubic millimetre of blood; secondly, the proportion (expressed as a percentage) of the polymorpho-nuclear leucocytes to other varieties; and thirdly, the glycogenic reaction The investigations of Ehrlich, Hayem, Cabot, and other authorities on the subject, go to show that, generally speaking, in inflammatory conditions the number of leucocytes per c.mm. of blood varies directly with the intensity and extent of the infection.

A modification, however, of this view has more recently been paid particular attention to, and was emphasised by Dr. MacCuen Smith of Philadelphia, at the meeting of the British Medical Association at Toronto in 1906. It was stated that the number of leucocytes per c.mm. varies rather with the body resistance, while it is the percentage of polymorpho-nuclear leucocytes which varies with the intensity and extent of the infection. Thus, a large number of leucocytes per c.mm. indicates a strong reaction against infection, while a small number indicates a weak reaction against a slight or, it may be, a severe infection. A low polymorpho-nuclear percentage indicates a slight infection, while a high percentage indicates a severe infection which may be associated with a large or a small number of leucocytes per c.mm. according to the resistive power of the patient.

Cabot found that in appendicitis there was no increase in the total number of leucocytes in cases where there was little call on the resistive power,—that is, in mild cases,—and in cases where the resistive power failed entirely. According to MacCuen Smith, if in inflammatory conditions the polymorpho-nuclear percentage is less than 70, the presence of pus is not suspected. Pus is uncommon with a percentage of less than 80, except in children, where it has been found with a count of 73 per cent. When the polymorpho-nuclears number more than 93 per cent. a very severe infection is indicated. A count of more than 95 per cent. indicates an almost certainly fatal infection. Sondern found that a count of less than 70 per cent. excludes the presence of pus or gangrene, while more than 85 per cent. means practically always pus or gangrene. To Sondern's generalisations exceptions are recorded.

In some cases, while a certain amount of information may be derived from a single leucocyte examination, if the blood is examined at intervals a rise or fall in the count may be detected, indicating—(*a*) An extension or retrogression of the inflammatory process, if the polymorpho-nuclear percentage has risen or fallen; or (*b*) an increase or diminution of the body resistance, if the number of leucocytes per c.mm. has risen or fallen.

The glycogenic reaction is a phenomenon to which attention has been directed by Locke, Lovell Gulland, and others. Locke found it present in cases associated with the presence of pus, but considered that it was not a reliable indication of its presence, in that it is sometimes absent in cases of small abscesses, and where drainage has been established.

The Normal Leucocyte Count.—In considering the subject of deviation of the leucocyte count from the normal, one is at once confronted by the question of what is the normal. The standard is not a constant one, and we have to be content with a normal which varies in health from 5000 to 10,000 leucocytes per c.mm. of blood. Any count above 10,000 leucocytes per c.mm. may be regarded as pathological. Rieder's figures were for the adult, 4200 to 9600 per c.mm., and 7200 to 12,400 per c.mm. for the child. The proportion of polymorpho-nuclear leucocytes to the other varieties also varies considerably. Ehrlich gives as the normal adult polymorpho-nuclear percentage 70 to 72. MacCuen Smith places it somewhat lower, 59 to 68—average 62.

In noting variations in the leucocyte count, there are many disturbing factors to be taken into consideration. A child shows a readier and a higher reaction against infection than an adult. Digestion is associated with an increase in the number of leucocytes. The most disturbing factor of all, however,—at least so far as the surgeon is concerned,—is the recent administration of a general anæsthetic and recent operation. This will be referred to later. The vast majority of the counts recorded in this paper were made in hospital, at the same hour of the day, and under the same conditions for all patients. They were all, with two exceptions, made by myself, so that any possible personal factor is practically the same throughout the whole series.

With a view to determine the effect of complications on the leucocyte examination, an attempt has been made in the first instance to gain some idea of the count to be looked for in acute and chronic cases of middle-ear suppuration without complication. These results have been compared with those obtained in the complicated cases.

The cases examined are dealt with under the following heads:—

1. Acute middle-ear suppuration without complication.
2. Acute middle-ear suppuration with mastoid complication.
3. Chronic middle-ear suppuration without complication.
4. Chronic middle-ear suppuration with mastoid complication.
5. Acute and chronic middle-ear suppuration with intracranial complication—(*a*) Extradural abscess; (*b*) cerebral and cerebellar abscess; (*c*) septic meningitis; (*d*) lateral sinus thrombosis.

1. ACUTE MIDDLE-EAR SUPPURATION WITHOUT COMPLICATION.—Care was taken in selecting these cases to exclude the presence of nasal accessory sinus trouble, and suppurative conditions in the nose or elsewhere. In all cases spontaneous perforation had already occurred, or paracentesis of the tympanic membrane had been performed, so that a certain amount of drainage had already been established, and probably the leucocyte count thereby lowered. In the eight cases of acute middle-ear suppuration without complication which were examined, the duration of the disease varied from six days to ninety days, giving an average of twenty-six days. The average number of leucocytes per c.mm. was 11,200—maximum, 17,000; minimum, 6800. The average polymorpho-nuclear percentage was 69—maximum, 81; minimum, 57. The glycogenic reaction was present in three out of the five cases in which it was looked for. The total leucocyte counts, then, and the polymorpho-nuclear percentages were on the average rather higher than normal. In five of the eight cases the number of leucocytes per c.mm. exceeded 10,000, and in five the polymorpho-nuclears numbered more than 68.

2. ACUTE MIDDLE-EAR SUPPURATION WITH MASTOID COMPLICATION.—In fifteen cases of acute middle-ear suppuration with mastoid complication, the average duration of the otitis media was six weeks—maximum, sixteen weeks; minimum, one week. The leucocytes averaged 12,400—maximum, 20,600; minimum, 7200 per c.mm. The average polymorpho-nuclear percentage in thirteen cases was 73·3—maximum, 86; minimum, 56. The glycogenic reaction was present in six out of eight cases examined. Fourteen of the cases were operated upon. In eight there was a subperiosteal abscess in addition to the mastoid cell disease. In four pus was only present in the mastoid antrum and cells, and in two there was cario-necrosis of bone. The acute cases then, with mastoid complication, showed—as one would expect—a higher count on the average than those without complication. The figures, however, varied within such wide limits that it was practically impossible in any one case, from the leucocyte count alone, to say whether it was an uncomplicated case or one with mastoid complication. In the majority, however, the count was at least confirmatory of the conclusions drawn from the clinical

phenomena, and those conclusions were substantiated at the operation. Three of the cases are detailed below.

Case 1.—W. G., male, æt. 50; alcoholic.—*Acute otitis media suppurativa.*—Duration, one month. Acute inflammation still present; painful; nothing to suggest mastoid infection; no suppuration elsewhere.

March 5, 1907.—Leucocytes, 6800 per c.mm.; polymorpho-nuclears, 69 per cent. Glycogenic reaction negative. The leucocyte count at this stage confirmed the clinical picture. Patient was instructed to syringe with boracic acid and instil peroxide of hydrogen. Returned three months later; treatment neglected; acute pain, swelling over the mastoid.

June 4, 1907.—Leucocytes, 8000 per c.mm.; polymorpho-nuclears, 82 per cent. Glycogenic reaction positive.

June 5, 1907.—Schwartze operation. Large subperiosteal abscess. Mastoid cells contained pus. Extensive bone destruction.

June 10, 1907.—Leucocytes, 6400 per c.mm.; polymorpho-nuclears, 72 per cent. Glycogenic reaction negative. Recovery uneventful.

This case is interesting in that it shows a low total leucocyte count with a high polymorpho-nuclear percentage, indicating a lack of reaction associated no doubt with the patient's alcoholic habits. It also shows the advantage of a systematic leucocyte examination, for, while a count of 8000 may signify little by itself, it may mean much when the previous count was 6800.

Case 2.—A. L., æt. 33, male.—*Right acute middle-ear suppuration.*—Duration, seven weeks. Mastoid swelling for three days. Slight nasal discharge.

November 24, 1906.—Leucocytes, 14,000; polymorpho-nuclears, 84 per cent. At the operation there was found a subperiosteal abscess with pus and bone destruction in the mastoid process. There was a considerable amount of oozing of blood throughout the operation. Culture from the pus—*Streptococcus pyogenes.* Immediately after operation, leucocytes, 11,900; polymorpho-nuclears, 90 per cent. Seven hours after operation, leucocytes, 18,750; polymorpho-nuclears, 89 per cent.

November 25, 1906.—Leucocytes, 16,200; polymorpho-nuclears, 79 per cent.

November 27, 1906.—Leucocytes, 8700; polymorpho-nuclears, 71 per cent.

The patient made an uninterrupted recovery.

This case is fairly typical of the progress of the leucocyte count after operation in acute case with mastoid complication.

Case 3.—Mrs. W., æt. 40.—*Pain in right middle ear.*—Duration, five weeks; discharge for three weeks; mastoid œdema, two days.

October 26, 1906.—Admitted to hospital. Leucocytes, 20,600 per c.mm.; polymorpho-nuclears, 86 per cent. Patient was put to bed preparatory to operation upon the following morning.

October 27. 1906.—Local condition improved. Operation postponed.

October 29, 1906.—Improvement continued. Leucocytes, 10,500 per c.mm.; polymorpho-nuclears, 78 per cent.

November 2, 1906.—Leucocytes, 6000 per c.mm.

November 10, 1906.—Discharged well, no operation having been performed. Perforation healed.

This was a case apparently of mastoid complication which recovered without operation. The leucocyte count was much higher than was found in any of the uncomplicated acute cases, and corroborated the diagnosis of complication. A very high count, then, is not necessarily a hard-and-fast indication for operation. The fall in the count associated with the clinical improvement is very striking.

3. CHRONIC MIDDLE-EAR SUPPURATION WITHOUT COMPLICATION.—As in the acute cases, care was taken to exclude suppuration elsewhere; one case had atrophic rhinitis. In nine cases examined, the average duration of the disease was fifteen years—maximum, thirty-five years; minimum, two years. The average total leucocyte count was 10,200 per c.mm.—maximum, 18,700; minimum, 4700. The average polymorpho-nuclear percentage in four cases was 66—maximum, 80; minimum, 55. The glycogenic reaction was absent in each of the two cases in which it was looked for. In chronic uncomplicated cases, then, the average number of leucocytes per c.mm. was found to be slightly in excess of the normal. In only two out of the nine cases, however, were there more than 10,000 leucocytes per c.mm. The average polymorpho-nuclear percentage was well within the normal limits, and in only one case out of four were these limits exceeded. Compared with the acute uncomplicated cases of middle-ear suppuration, the figures were, as one would expect, somewhat lower in the chronic cases, but the difference is remarkably small.

4. CHRONIC MIDDLE-EAR SUPPURATION WITH MASTOID COMPLICATION.—Seventeen cases of chronic middle-ear suppuration with mastoid complication were examined before operation. The average duration of the otitis was eight years—maximum, twenty-three years; minimum, two years. Of these—(*a*) Seven were operated on because of acute mastoid symptoms, and (*b*) ten for other reasons.

(*a*) In the seven cases with acute symptoms, the exacerbation occurred on the average five years after the onset of the otitis. The average number of leucocytes per c.mm. was 17,600—maximum, 22,100; minimum, 12,700. The average percentage of polymorpho-nuclear cells was 73, the highest 83, and the lowest 60. The glycogenic reaction was positive in all of five cases examined. At the operation disease of the mastoid cells was found in all. Two had in addition subperiosteal abscesses. The two latter showed higher polymorpho-nuclear percentages than any of the other five (83 per cent. and 81 per cent.). The number of leucocytes in each case was above the normal. The polymorpho-nuclears were on the average also above the normal, but in two cases they fell below 68 per cent. Compared with the results in the chronic cases without mastoid complication, the rise in both the total leucocyte count and the polymorpho-nuclear percentage is obvious. It is interesting to note that in comparison with the cases of acute middle-ear suppuration complicated with mastoid suppuration, the chronic mastoid cases with acute exacerbations had on the average practically the same polymorpho-nuclear percentage, but showed on the average a much larger number of leucocytes per c.mm. It seems as if the patient's resistive power were increased by the chronicity of the disease.

(*b*) In the ten "quiet" cases, the mastoid operation was undertaken at an average period of ten and a half years after the onset of the otitis. The leucocytes averaged 9300 per c.mm.—maximum, 15,000; minimum, 4900. The average polymorpho-nuclear count was 64·6 per cent.—maximum, 79 per cent.; minimum, 48 per cent. The glycogenic reaction was positive in three out of eight cases examined. At the operation, disease of the mastoid was found in all the cases. These figures on the average do not exceed the normal. In five of the ten cases, the leucocytes numbered more than 10,000, and in three the polymorpho-nuclear percentage was greater than 68. Compared with the cases of acute middle-ear suppuration with mastoid complication, and with the cases of chronic middle-ear suppuration manifesting acute symptoms, the counts in the "quiet" group are distinctly lower. It is a rather curious fact, too, that they tend to be even lower than the counts in the series of chronic cases without complication.

In eighty-four chronic cases collected by M'Kernon, of adults showing definite clinical signs of mastoid involvement, the lowest polymorpho-nuclear percentage was 73·2, and the highest 97·6. In eighteen cases which did not show clinical signs, but were proved on operation to be suffering from mastoid suppuration, the percentages ranged from 73·2 to 86·4.

In forty-seven similar cases in children showing definite signs of mastoid suppuration, the percentage varied between 68·6 and 82·8; and of eleven cases showing no signs, the percentages lay between 72·2 and 83·4 in eight cases, and between 42·4 and 56·8 in three cases.

The following two cases are fairly typical of the two groups (*a*) and (*b*):—

CASE 4 (*a*).—W. K., æt. 8, male.—*Double otitis media suppurativa* of three years' duration; acute pain, mastoid swelling and mastoid tenderness on right side for four days.

June 29, 1906.—Temperature, 102°·8; pulse, 108. Patient very ill. Leucocytes, 21,600; polymorpho-nuclears, 81 per cent.; glycogenic reaction positive. Radical operation—subperiosteal abscess—pus in the mastoid cells; cholesteatoma in the antrum. Convalescence was uneventful.

Case 5 (*b*).—A. N., æt. 29, female.—*Discharge from left ear for twenty years after measles: attic perforation.*—Has had long course of intratympanic syringing; ossiculectomy some months ago; no acute symptoms.

May 29, 1907.—Leucocytes, 10,300; polymorpho-nuclears, 66 per cent.; glycogenic reaction slight. Radical operation—mucopus and granulations in the antrum and attic. Culture from pus—*Proteus vulgaris* and a diphtheroid bacillus.

May 31, 1907.—Leucocytes, 11,400; polymorpho-nuclears, 84 per cent.; glycogenic reaction negative.

June 13, 1907.—Doing well. Leucocytes, 3800; polymorpho-nuclears, 63 per cent.; glycogenic reaction negative. Patient made an uninterrupted recovery.

5. Acute and Chronic Middle-Ear Suppuration with Intracranial Complication.—It is perhaps in cases of intracranial complication, both on account of their gravity and on account of the frequent obscurity of the symptoms, that the surgeon would most gladly welcome any helpful indications afforded by leucocyte examination. In connection with these cases it very frequently happens, especially where there are acute symptoms referable to the mastoid, that the surgeon elects to confine his operation to the mastoid in the first instance. It is during the succeeding twenty-four or forty-eight hours, while waiting to see to what extent the condition may clear up as a result of his operation, that he would most value information from leucocyte examination; but it is during this same period that the effect of recent general anæsthesia and operation upon the leucocyte count is most marked.

Effect of General Anæsthesia and Recent Operation upon the Leucocyte Count.—Da Costa and Kalteyer found an increase of 5000 per c.mm. in the leucocytes after the administration of ether in fifty cases. Chloroform was found to have effects of a similar nature, but of longer duration. According to Da Costa, there is a post-operative increase of 5000 to 10,000 per c.mm. in the number of leucocytes, the increase passing off in four days at the latest.

With the object of estimating the effect and the duration of the effect on the leucocyte count of recent general anæsthesia and operation, ten cases have been collected where an examination was made immediately before and after operation, and at intervals during the next few days. The anæsthetic in each case was chloroform. The operation in each instance involved the opening up of a more or less septic mastoid process. This, of course, meant the making of a certain amount of raw surface, and probably the introduction into the system of an additional quantity of toxin. Of the ten cases examined, seven showed an immediate rise after operation in the total number of leucocytes per c.mm., and two, a rise after a slight temporary fall. In the nine cases where a rise occurred, the maximum was reached within twenty-four hours. The one case in which there was no rise was that of a patient with acute mastoid symptoms, very drowsy and lethargic, who died four weeks later from tuberculous meningitis. The two in which a preliminary fall occurred were both cases in which there was considerable oozing of blood throughout the operation. The average amount of rise was 8000 leucocytes per c.mm., and the maximum 14,000. The average duration of the rise was 3·6 days, and the maximum five days. The polymorpho-nuclear percentage rose in five cases out of six within twenty-four hours. The average rise was 8 per cent., and the maximum 13 per cent. The average duration of the rise was 2·6 days, and the maximum four days.

The cases of intracranial complication from which the following notes were taken numbered seventeen. Of these, four complicated acute, and twelve chronic suppurative otitis media. In the remaining case no satisfactory history could be obtained as to the duration of the otitis. They are grouped under the following headings:—Extradural abscess—Three cases, all complicating chronic otitis media. Brain abscesses.—(1) Cerebellar.—Two cases complicating chronic otitis media. (2) Cerebral.—Four cases, one complicating acute otitis media, two complicating chronic otitis media, one doubtful. Septic meningitis.—Four cases, one complicating acute otitis media, three complicating chronic otitis media. Lateral sinus thrombosis.—Four cases, two complicating acute otitis media, two complicating chronic otitis media.

Extradural abscess.—In the three cases examined, the average number of leucocytes was 18,400 per c.mm.—maximum, 30,000; minimum, 9300. Polymorpho-nuclear cells in the two cases examined numbered 81 per cent. and 91 per cent. The glycogenic reaction was present in the one case in which it was looked for.

Case 6.—J. S., æt. 9, female.—*Otitis media suppurativa.*—For six years after scarlet fever. Pain for one week; vomiting for two days; frontal headache; tenderness and œdema over mastoid.

Day of admission.—Rigor; temperature, 105°; pulse very rapid. Leucocytes, 30,000 per c.mm; polymorpho-nuclears, 89 per cent. Operation on the same day. Preliminary ligature of internal jugular vein. Very extensive disease of mastoid. Abscess round the sigmoid sinus with pus under pressure. Sinus incised; no thrombosis. Culture of pus, *pneumococcus.*

One day after operation.—Leucocytes, 30,000 per c.mm.; polymorpho-nuclears, 88 per cent.

Two days after operation.—Leucocytes, 15,000 per c.mm.; polymorpho-nuclears, 78 per cent. Count continued to fall and patient to improve. Patient was discharged in good health.

The steady fall in the leucocyte count as the gravity of the condition diminished was a point of interest.

CASE 7.—R. R., æt. 37, male.

October 16, 1907.—Admitted with symptoms similar to the last case. Leucocytes, 9300 per c.mm.; polymorpho-nuclears, 91 per cent. Glycogenic reaction positive. *Operation*—internal jugular ligatured; sigmoid sinus found healthy; extradural abscess.

October 25, 1907.—Death.

This was a marked example of severe infection with very low reaction.

CASE 8.—D. M., æt. 55, male.—*Chronic middle-ear suppuration.*—Four and a half years' duration.

September 16, 1906.—Admitted with symptoms suggesting intracranial abscess. Leucocytes, 16,000 per c.mm.

September 19, 1906.—*Operation*—large extradural abscess.

September 20, 1906.—Leucocytes, 15,000 per c.mm.; polymorpho-nuclears, 75 per cent. Patient's condition did not improve, but the count fell steadily.

September 24, 1906.—Leucocytes, 11,000 per c.mm.; polymorpho-nuclears, 59 per cent. Further exploration carried out—nothing found.

September 28, 1906.—Death. At sectio a subdural cerebellar abscess and commencing abscess of left frontal lobe were found.

In this case the leucocyte examination failed signally to afford any information of practical value, and was indeed misleading.

Brain abscess.—In the six cases of brain abscess the average total leucocyte count was 12,500 c.mm. — maximum, 14,000; minimum, 10,300. The polymorpho-nuclear cells averaged in four cases 84·8 per cent.—maximum, 88 per cent.; minimum, 77 per cent. The glycogenic reaction was present in three of the four cases examined. The comparatively small range of variation in the counts must be noted, and will be referred to later.

(1) Cerebellar abscess.—One of the cerebellar cases is worthy of detail.

CASE 9.—H. Y., æt. 15, male.—*Left chronic otitis media suppurativa* for some years.

March 1, 1907.—Admitted to hospital. No acute mastoid symptoms; somewhat dull and lethargic, but cerebration good. Headache and vomiting; doubtful nystagmus; no optic neuritis. Temperature, 98°·4; pulse, 60; leucocytes, 13,300; polymorpho-nuclears, 75 per cent. Glycogenic reaction negative. After admission, for a few days, patient's condition improved—vomiting ceased, mental condition brighter, but still complaining of frontal headache. Both the total leucocyte count and the polymorpho-nuclear percentage fell gradually, reaching on 4th March 1907, leucocytes 8500 and polymorpho-nuclear percentage 71.

March 7, 1907.—Patient's mental condition rather worse again. No new symptoms. Operation decided upon on account of lethargy, slow pulse and subnormal temperature, coupled with the fact that the leucocyte count had risen again to 13,200 leucocytes per c.mm.; polymorpho-nuclear percentage, 77; glycogenic reaction still negative.

Operation, 11 A.M.—Mastoid cells healthy; antrum, aditus, and attic full of cheesy deposit; cerebellar abscess containing $\frac{3}{4}$ oz. of pus found and drained. Culture of pus—*Bacillus coli.* 2 P.M.—Leucocytes, 21,000; polymorpho-nuclears, 82 per cent. 9 P.M.—Leucocytes, 37,000; polymorpho-nuclears, 90 per cent. The counts on the five days following the operation were 28,600 and 90 per cent., 29,400 and 87 per cent., 13,800 and 80 per cent., 11,800 and 77 per cent., 9300 and 78 per cent. The wound showed little reaction, and resembled an operation on the cadaver. On 11th March 1907 some reaction was noted. The count on 13th March 1907 was—leucocytes, 14,000 per c.mm.; polymorpho-nuclears, 72 per cent. The total leucocyte count and the polymorpho-nuclear percentage continued to fall, and on 25th March 1907 was—leucocytes, 9000; polymorpho-nuclears, 64·6 per cent. The patient made a perfect recovery.

In this case it is of interest to note the fall in the counts with the improvement in the condition previous to operation. With the increase in the lethargy on the morning of operation there was a rise in the leucocyte count, which strengthened the impression that the inflammatory process was extending, and encouraged the surgeon to operate.

Attention is also drawn to the progressive fall in the count during convalescence, and the rise in the total leucocyte count with the appearance of reaction in the tissues about the wound.

(2) Cerebral abscess.—The total leucocyte counts in the four cases were 14,000, 13,100, 12,400, and 10,300. In three of them the polymorpho-nuclear percentages were 86·6, 87, and 88.

The following case shows several points of interest:—

CASE 10.—J. W., æt. 31, male.—*Left otitis media suppurativa.*—Suppuration of doubtful duration.

March 27, 1907.—Admitted to hospital. Pain in head, vomiting, giddiness, slow cerebration; no optic neuritis; emaciation. Temperature, 97°·4; pulse, 49. Leucocytes, 12,400 per c.mm.; polymorpho-nuclears, 86·6 per cent. Glycogenic reaction positive. *Operation*—pus in the mastoid antrum—large temporo-sphenoidal abscess—pure culture of *Staphylococcus albus.*

March 28, 1907.—Leucocytes, 15,300; polymorpho-nuclears, 88 per cent.

March 29, 1907.—Leucocytes, 17,900; polymorpho-nuclears, 81·6 per cent. Patient doing well.

March 30, 1907.—Leucocytes, 12,200; polymorpho-nuclears, 74 per cent.

April 1, 1907.—Drain removed from abscess cavity.

April 2, 1907.—Leucocytes, 10,500; polymorpho-nuclears, 82 per cent. Patient distinctly worse. Forceps inserted into cavity; about 2 drms. of pus escaped. Tube reinserted.

April 4, 1907.—Leucocytes, 11,700; polymorpho-nuclears, 80·6 per cent. Patient much worse.

April 11, 1997.—Leucocytes, 12,200; polymorpho-nuclears, 84 per cent.

April 16, 1907.—Death.

Sectio.—Œdema of the brain. No general meningitis.

In this case, so long as the patient continued to improve, the count continued to fall, and when the case commenced to do badly, the count at once began to rise.

The next case presented peculiar difficulties, and is interesting inasmuch as the count was disturbed by the fact that all three conditions—extradural abscess, localised meningitis, and temporo-sphenoidal abscess—were present.

Case 11.—J. G., æt. 35, male.—*Double chronic otitis media suppurativa.*—Six years' duration.

November 23, 1907.—Admitted. Pain, vertigo, rigors for last four days. Pulse, 108; temperature, 100°·4. No optic neuritis. Leucocytes, 10,300; polymorpho-nuclears, 87 per cent. Glycogenic reaction positive.

November 24, 1907.—Operation on left mastoid; caries of tegmen tympani and absorption of roof of antrum; large extradural abscess.

November 29, 1907.—Not doing well. Cerebration poor; continual headache. Temperature rose, but pulse remained slow. Leucocytes, 18,600 per c.mm.; polymorpho-nuclears, 82 per cent. Lumbar puncture; no increase in tension; slight turbidity; yellow deposit on centrifuging; large lymphocytosis; very large number of polymorpho-nuclear pus cells; no organisms. Both the count and the lumbar puncture were more suggestive of meningitis than abscess. From the clinical features, however, the slow pulse and the slow cerebration associated with the inability to name objects, a left temporo-sphenoidal abscess was diagnosed, and operation was performed. In addition to this abscess, there was found a limited area of meningitis immediately above the tegmen tympani around a small subdural abscess. At the sectio no general meningitis was found.

Septic meningitis.—The four meningitis cases which were examined were found to have an average total count of 25,500 leucocytes per c.mm.—maximum, 33,700; minimum, 17,000. The polymorpho-nuclear percentages in three cases were 91, 87, and 82—average, 86·6. The glycogenic reaction was present in the one case in which it was looked for.

A rise in the leucocyte count with the onset, apparently, of the meningitis is a striking feature in the next case noted.

Case 12.—G. B., æt. 24, male.—*Acute suppurative otitis media.*—Four weeks' duration.

November 10, 1906.—Admitted to hospital.

November 11, 1906.—Rigor. Leucocytes, 14,000 per c.mm.; polymorpho-nuclears, 84 per cent. Lumbar puncture; no increase in pressure; no lymphocytosis; no organisms.

November 12, 1906.—*Operation.*—Extensive mastoid disease. Pus under tension; sinus apparently healthy. Cultivation of pus—*streptococcus* and *Bacillus mucosus capsulatus.*

November 13, 1906.—Leucocytes, 14,700 per c.mm.; polymorpho-nuclears, 73 per cent.

November 24, 1906.—Leucocytes, 11,900 per c.mm.; polymorpho-nuclears, 64 per cent.

December 10, 1906.—Progressing slowly, but doing well. Leucocytes, 10,600 per c.mm.; polymorpho-nuclears, 70 per cent.

January 3, 1907.—Up and walking about.

January 6, 1907.—(Eight weeks after the operation.) Onset of symptoms attributed to influenzal attack.

January 7, 1907.—Leucocytes, 33,700 per c.mm.; polymorpho-nuclears, 91 per cent. Lumbar puncture; large numbers of pus cells and streptococci.

January 8, 1907.—Death.

Sectio.—General septic meningitis.

In Case 13, on the other hand, though the leucocyte counts suggested the possibility of the presence of meningitis, there was clinically no sign of it, and the patient recovered.

Case 13.—H. W., æt. 22, male.—*Chronic suppurative otitis media.*—Duration nine years. Acute symptoms for seven days.

November 5, 1906.—Leucocytes, 20,000 per c.mm.; polymorpho-nuclears, 78 per cent. *Operation*—very extensive mastoid disease: dura mater exposed.

November 7, 1906.—Leucocytes, 30,000 per c.mm.; polymorpho-nuclears, 93 per cent.

November 10, 1906.—Leucocytes, 12,500 per c.mm.; polymorpho-nuclears, 85 per cent.

November 14, 1906.—Leucocytes, 20,600 per c.mm.; polymorpho-nuclears, 88 per cent. No apparent reason for the high count. Temperature, 99°·2. Excessive amount of discharge. Otherwise case doing well.

November 18, 1906.—Leucocytes, 19,400 per c.mm.; polymorpho-nuclears, 78 per cent. Case discharged later in good health.

Lateral sinus thrombosis.—In the four cases of lateral sinus thrombosis the average total leucocyte count was 14,500—maximum, 20,000; minimum, 5000 per c.mm. Omitting one case, however (Case 15 below), the average was 17,600. A differential count was unfortunately only made in one case where the polymorpho-nuclears were found to number 83 per cent.

Case 14.—E. D., æt. 17, female.

November 30, 1907.—Furuncle in right external auditory meatus.

December 3, 1907.—Pains in back.

December 4, 1907.—Swinging temperature. Rigors; no pain. Leucocytes, 11,200 per c.mm.; polymorpho-nuclears, 79 per cent.

December 6, 1907.—Leucocytes, 10,800 per c.mm.

December 7, 1907.—Still swinging temperature and rigors; no pain; no mastoid tenderness; no redness nor bulging of tympanic membranes; no discharge. Leucocytes, 16,800 per c.mm.

December 9, 1907.—Some right mastoid tenderness, but no pain; bulging of membrane; no discharge; lumbar puncture negative; optic discs normal; general condition unchanged. Leucocytes, 16,800.

Operation.—Mucopus in right tympanum and antrum. Sinus lay close to posterior meatal wall and contained dark blood clot; internal jugular vein ligatured; large clot removed from sigmoid sinus; a pure culture of *Staphylococcus pyogenes albus.*

December 12, 1907.—Doing well.

December 13, 1907.—Temperature, 103°; rigor. Leucocytes, 19,600 per c.mm.; polymorpho-nuclears, 90 per cent. Some blood clot and purulent material washed out of jugular bulb.

Uninterrupted recovery.

The rise in the leucocyte count from 11,200 to 16,800 per c.mm. indicated the progressive nature of the mischief, and was a factor which was taken into consideration in deciding upon operation.

The next case is an example of very severe infection with practically no reaction.

CASE 15.—J. W., æt. 18, male.—*Double chronic otitis media suppurativa.*—Five years' duration. Acute symptoms for a week.

December 18, 1906.—Rigor. High temperature. Admitted to hospital. Radical operation upon right mastoid; pus under pressure; very extensive disease of bone.

December 23, 1906.—Leucocytes, 5000 per c.mm.; pulse remains rapid and temperature high. No sign of reaction about wound over mastoid. Wound re-opened; right lateral sinus unhealthy; sinus opened and right internal jugular vein ligatured; no thrombosis.

December 26, 1906.—Still doing very badly; temperature high; sinus exposed further; washed through from opening in sinus to point of ligature of internal jugular.

January 3, 1907.—Frequent rigors; high temperature; proptosis; dulness in left side of chest. Leucocytes, 5000 per c.mm.

January 5, 1907.—Ligature of left internal jugular vein.

January 9, 1907.—All the wounds have the same indolent appearance.

January 13, 1907.—Death.

Sectio.—No meningitis. Thrombosis of most of the intracranial venous sinuses; no abscess; left pleural cavity contained pus.

The following is a case which presented some of the features of intracranial complication—apparently sinus thrombosis—but which proved to be one of simple mastoid complication. The results of leucocyte examination seemed quite consistent with a diagnosis of intracranial trouble.

CASE 16.—M. H., æt. 13, female.—*Chronic otitis media suppurativa.*—Some years' duration.

February 11, 1907.—Slight mastoid tenderness; rigors; temperature normal. Pulse, 80. Patient rather apathetic. Lumbar puncture; no increased tension; no pus cells; no lymphocytosis; no organisms. Leucocytes, 12,000 per c.mm.; polymorpho-nuclears, 84 per cent.

Operation.—Ligature of internal jugular vein; pus in antrum, otherwise marked absence of disease. Sigmoid sinus apparently healthy. Case to be watched.

February 13, 1907.—Leucocytes, 20,600 per c.mm.; polymorphonuclears, 91 per cent.

February 15, 1907.—Leucocytes, 12,900 per c.mm.; polymorphonuclears, 84 per cent.

February 18, 1907.—Leucocytes, 11,800 per c.mm.; polymorphonuclears, 78 per cent.

February 25, 1907.—Leucocytes, 7700 per c.mm.; polymorphonuclears, 65 per cent.

Case did well.

While the initial examination gave little or no aid in diagnosis, the systematic examination of the leucocytes from time to time was a valuable adjunct to the other indications of the progress of the case after operation.

In all of the seventeen cases, therefore, of intracranial complication, the total leucocyte count was above 10,000, except in two, where there were other obvious signs of deficient reaction. The highest total counts were found in cases of *septic meningitis*, where in every instance the leucocytes numbered 17,000 or more per c.mm. According to the observations of Starr, the count in septic meningitis shows a rapid rise to about 25,000 (compared with 25,500 in the cases noted in this paper). Williams and Cabot cited forty-seven cases of non-tuberculous meningitis, in all of which, except two, there was a count of over 10,000, some reaching as high as 50,000. The next highest total counts occurred in *extradural abscess* (18,400 per c.mm.) and in *sinus thrombosis* (14,500 per c.mm.). In both of these groups, however, the maximum and minimum limits showed a wide range. The lowest average—12,500—was found in cases of *abscess of the brain substance*, where the counts in the six cases lay consistently between 10,000 and 14,000. It must be noted, however, that in Case 9, quoted above, three days before operation, with a temporary improvement in the patient's condition, there was also a temporary fall in the total count to 8500 per c.mm. and in the polymorpho-nuclear percentage to 71. Da Costa cites six cases of brain abscess where the average was 13,400 and the limits 18,560 and 6800. Starr observed that in brain abscess the total leucocyte count rose slowly to about 15,000.

With regard to the polymorpho-nuclear percentage in the intracranial cases, no case was found to have a percentage of less than 77. (Note Case 9 again.) According to Starr, if the proportion of polymorpho-nuclear leucocytes changes from 65 or 70 per cent. to 75, 80, or 85 per cent., the probability of intracranial complication is very great. Dr. James M'Kernon found that in six cases of sinus phlebitis the highest polymorpho-nuclear percentage was 96·6, and the lowest 86·8. One of the cases in our series showed a percentage of 83.

Tuberculous meningitis.—Cases of tuberculous meningitis occur occasionally in conjunction with ear disease, and it is useful to note the value of leucocyte examination in this connection. Limbeck, Pick, and Rieder collected a number of cases of tuberculous meningitis, and found that in the majority of them there was no rise in the leucocyte count. Rieder, however, has cited one with a count of 14,400 per c.mm., and Cabot reported seven, in five of which the count ranged from 14,700 to 34,300 per c.mm. Da Costa states: " The myth still entertained to some extent that tuberculous and non-tuberculous meningitis differ, in that the former does not cause leucocytosis, should have been dispelled long ago." Absence of leucocytosis, he says, suggests tuberculous meningitis, but the presence of leucocytosis does not exclude it. In the undermentioned case the persistently low count practically excluded a complication of a septic nature, and suggested tuberculous meningitis.

CASE 17.—B. H., æt. 8, female.—*Offensive discharge from left ear for some years.*—Two weeks before admission, discharge ceased; patient became drowsy. Temperature, 100° to 101°·5. Photophobia; occipital pain.

December 13, 1906.—Admitted to hospital. Leucocytes, 9700 per c.mm.; polymorpho-nuclears, 67 per cent.

December 17, 1906.—Mastoid operation; mucopus in antrum; remarkably little disease. Agar culture of pus; no growth. The patient was watched for further developments.

December 18, 1906.—Leucocytes, 7500 per c.mm.; polymorpho-nuclears, 72 per cent.

December 19, 1906.—Leucocytes, 10,600 per c.mm.; polymorpho-nuclears, 72 per cent.

December 20, 1906.—Leucocytes, 9400 per c.mm.; polymorpho-nuclears, 70 per cent. Drowsiness continued. Question of exploration was considered, but no operation was performed because of low leucocyte count.

December 31, 1906.—A rigor at this date; no interference. Leucocytes, 11,500 per c.mm.; polymorpho-nuclears, 62 per cent. The blood was examined at intervals thereafter, but the count remained about the same.

January 26, 1907.—Death.

Sectio.—Tuberculous meningitis.

Résumé of Results.

	Leucocytes.			Polymorpho-nuclears.			Glycogenic Reaction.
	Aver.	Max.	Min.	Aver.	Max.	Min.	Positive in
Acute middle-ear suppuration without complication . . .	11,200	17,000	6,800	69	81	57	$\frac{3}{5}$
Acute middle-ear suppuration with mastoid complication . .	12,400	20,600	7,200	73·3	86	56	$\frac{6}{8}$
Chronic middle-ear suppuration without complication . . .	10,900	18,700	8,100	66	80	55	$\frac{0}{2}$
Chronic middle-ear suppuration with mastoid complication (acute symptoms) . . .	17,600	22,100	12,700	73	81	60	$\frac{3}{5}$
Chronic middle-ear suppuration with mastoid complication (quiet) .	9,300	15,000	4,700	64·6	79	48	$\frac{3}{9}$
Extradural abscess .	18,400	30,000	9,300	90	91	89	$\frac{1}{1}$
Brain abscess . .	12,500	14,000	10,300	84·8	88	77	$\frac{3}{4}$
Septic meningitis . .	25,500	33,700	17,000	86·6	91	82	$\frac{1}{1}$
Lateral sinus thrombosis	14,500	20,000	5,000	83	...	...	...

After Operation under Chloroform.	Leucocytes.	Polymorpho-nuclears.
Rise in	$\frac{9}{10}$ cases.	$\frac{5}{6}$ cases.
Average amount of rise	8,000 per c.mm.	8 per cent.
Maximum amount of rise	14,000 ,,	13 ,,
Average duration of rise	3·6 days.	2·6 days.
Maximum duration of rise	5 ,,	4 ,,

CONCLUSIONS.—1. From the foregoing observations it is evident that here, as in inflammatory conditions elsewhere, the number of leucocytes per c.mm. is an indication of the amount of body reaction, while the polymorpho-nuclear percentage indicates the degree of infection. A leucocyte examination, therefore, always gives information of greater or less value.

2. Where clinical indications are definite, leucocyte examination may corroborate, but must not be allowed to override these indications.

3. Repeated examination of the blood is of more value than a single examination, as a progressive rise or a progressive fall in the leucocyte count gives a definite indication of the progress of the condition.

4. In uncomplicated cases of *acute middle-ear suppuration*, the total leucocyte count and the polymorpho-nuclear percentage were higher than normal in 62 per cent. of the cases. In cases of acute middle-ear suppuration with mastoid complication the total leucocyte count was above normal in 66 per cent., and the polymorpho-nuclear cells in 77 per cent. of the cases. Little information of diagnostic value was obtained, because in a single examination of the blood the leucocyte count was in some instances higher in the uncomplicated cases than in those with mastoid complication.

5. In uncomplicated cases of *chronic middle-ear suppuration*, the total leucocyte count in 33 per cent., and the polymorpho-nuclear percentage in 25 per cent. of the cases, were above normal. In cases of mastoid complication with an acute exacerbation, the total leucocyte count was above normal in every instance, while the polymorpho-nuclear percentage was above normal in 66 per cent. of the cases. In cases of mastoid complication without acute symptoms, the total leucocyte count in 44 per cent., and the polymorpho-nuclear percentage in 37 per cent., were above normal.

6. In cases of acute and chronic middle-ear suppuration with and without mastoid complication, the leucocyte examination gave information of a general nature as regards the severity and progress of the inflammatory condition, but practically no aid in differential diagnosis.

7. In cases of acute and chronic middle-ear suppuration with *intracranial complication*, the total leucocyte count was above normal in 88 per cent.; the polymorpho-nuclear percentage was above normal in all of them. If the polymorpho-nuclear percentage is less than 77 per cent., examination of the blood suggests the absence of an intracranial complication; when the polymorpho-nuclear percentage is above 86 per cent., there is strong presumptive evidence of an intracranial complication.

8. In cases of extradural abscess and sigmoid sinus thrombosis, examination of the leucocytes gave no special features characteristic of the nature and site of the lesion. It must be noted, however, that the cases of extradural abscess seemed to suffer more severely from toxic absorption than the other forms of intracranial complication as shown by the polymorpho-nuclear percentage.

9. In the cases of brain abscess, the total leucocyte count did not exceed 14,000. In the cases of septic meningitis the total leucocyte counts were decidedly higher than in those of brain abscess, being in no case less than 17,000. The polymorpho-nuclear percentage, however, was only slightly higher. A total leucocyte count of less than 14,000 suggests brain abscess; a count of more than 17,000 suggests meningitis. This series of leucocyte examinations also brought out the fact that while the

cases showed an almost equal amount of toxic absorption, there was in the meningitis cases a much higher degree of reaction than in the cases of brain abscess.

10. The glycogenic reaction was not of much value, as the presence of pus was already an established fact.

11. After operation and chloroform anæsthesia there was usually a rise both in the total leucocyte count and the polymorpho-nuclear percentage. This passed off as a rule within four days, at the latest in five days.

I wish to acknowledge my indebtedness to Dr. Logan Turner for the clinical material which he has placed at my disposal for the purpose of this investigation and for many helpful suggestions. Case 10 was under the care of Mr. F. M. Caird, who kindly gave me permission to examine the blood and include the results in this paper.

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PLASTIC OPERATION ON THE RENAL PELVIS FOR INTERMITTENT HYDRONEPHROSIS.

By Alexander Miles, F.R.C.S.Ed., *Assistant-Surgeon Royal Infirmary, Edinburgh ; Surgeon to Leith Hospital.*

In cases of intermittent hydronephrosis, uncomplicated by septic infection, and depending presumably upon a mechanical obstruction to the outflow of urine, the early removal of the obstruction by operation is imperatively called for, with a view to arresting the degenerative changes which occur in the kidney, and to conserving the organ while there is yet a possibility of its complete regeneration The curative results which follow tapping of the dilated pelvis are too uncertain to justify the time spent in making the attempt to obtain them, particularly in view of the risk of septic infection which attends the procedure. So long as the kidney substance retains any power of carrying on its excretory functions—and in cases of intermittent hydronephrosis there is always the presumption that it does—nephrectomy is unjustifiable. Nephrotomy and drainage is a tedious, troublesome, and uncertain method, and the possibility of a permanent urinary fistula is not an enticing prospect for the patient. It can scarcely be recommended, unless there is reason to believe that the other kidney would not be equal to the excretory demands made upon it after removal of the hydronephrotic one. In a certain proportion of cases the kidney can be preserved by removing the cause of obstruction by a plastic operation. The precise procedure to be followed in a given case can only be decided upon after exposing the kidney and noting the nature of the obstruction, and the means taken to remove this must vary with the conditions present. Although a considerable number of such operations have been recorded, the procedure may still be considered as in the experimental stage, and the detailed report of an individual case may not come amiss.

Case.—The following observations refer to the case of a young lady who for ten years had suffered from symptoms characteristic of an intermittent hydronephrosis. The obstruction to the outflow from the kidney proved to be a plate-like thickening of the wall of the renal pelvis, which acted as a valve closing the orifice of the ureter. Until she was 15 years of age the patient had enjoyed excellent health, but soon after leaving school she began to be troubled by a more or less continuous dull, sickening pain in the left side of the abdomen. This pain, which was always referred to the region just below the lower ribs, and did not shoot in any direction, persisted for about two years, and was associated with vague symptoms of gastro-intestinal disturbance and constipation, but with no marked impairment of the general health. Two years after the onset of the pain, the patient noticed in the left loin a round swelling about the size of a cricket-ball, which was slightly movable and tender on pressure. About this time she consulted a doctor, who said it was a floating kidney; but nothing seems to have been done for it. For a considerable time no difference was noticed in the swelling, but later it began to vary in size, enlarging for a few days and then diminishing again. At first these variations occurred erratically; later, at more or less regular intervals; and during the periods when the lump was increasing, the pain was more severe and the symptoms of "indigestion" became aggravated. By the time she was 20 the "attacks" had become quite regular in their incidence, occurring punctually every three weeks. For three days the patient suffered very severe pain, which was of a dull, boring character, making her feel so sick and ill that she had to lie up. Meanwhile the lump in her side was appreciably increasing, till, at its maximum, it reached the size of an infant's head; it was perfectly round and of stony hardness. When the swelling was reaching its maximum, the patient was unable to bear the pressure of her corsets, and the prominence in the ilio-costal area was noticeable through the clothes. She came to be able to count with certainty on the attack passing off at the end of the third day, and the crisis was marked by a sudden disappearance of the swelling and the attendant pain and illness, and coincidently she passed a large quantity of thin, limpid urine. After the swelling had gone she was fairly comfortable for a week or ten days, and then the discomfort began again, and eventually culminated in the three-days' attack of severe suffering. These attacks bore no constant relationship to the menstrual periods, but it was observed that if an attack happened to coincide with a period, the swelling emptied itself as soon as the menstrual flow began, even if this took place before the lump had reached its maximum size.

The patient's general health eventually began to suffer from the strain of these recurrent attacks; she became anæmic, thin, and worn out, and was unfit for her duties. At no time was there evidence of renal calculus, or of any organic disease of the urinary organs. The only time at which she had frequency of micturition was for a few hours after the crisis of each attack, and throughout the urine remained normal.

On examining the patient some days before the climax of an attack, with Dr. Oliphant Nicholson, under whose care she had then come, it was found that the swelling, which was obviously the kidney, was firm, round, and smooth; it was tender to pressure, and but slightly movable. An attempt to empty it by squeezing was unsuccessful. As the urine accumulated within the next few days, the swelling became distinctly larger, more tense, and more tender; and after it had emptied itself, the kidney could be palpated, and was recognised to be of about normal size and consistence. Although more mobile than a normal kidney, it could not be described as "floating."

In view of the regularity of the attacks, their definite duration, and the completeness with which the symptoms passed off when the excessive flow of urine took place, it seemed highly probable that the obstruction was at the outlet of the renal pelvis, and was due either to kinking of the upper end of the ureter from some alteration in the axis of the kidney when distended; to pressure of the dilated pelvis upon the ureter; or to the presence of a valve-like thickening of the hydronephrotic pelvis occluding the uretral orifice. The freedom with which the urine escaped when the obstruction was removed excluded the possibility of stenosis of the ureter; and the large quantity of healthy urine which escaped at each crisis led us to believe that the renal substance was both healthy and active.

It was therefore decided to explore the kidney with a view to determining the nature of the obstruction, and, if possible, overcoming it. This was done on the 19th June 1905. The kidney was exposed through the usual lumbar incision carried well down along the course of the ureter. As the hydronephrosis was empty at the time, there was little difficulty in shelling out the kidney, and this was not attended with much bleeding. When the kidney was withdrawn from the wound, it was found that the upper part of the organ appeared to be comparatively little altered in structure, and that there was still a considerable amount of secreting substance present. The lower pole, however, was distended and formed a pendulous thin-walled sac continuous with the pelvis, which was also dilated and thin. In the collapsed condition of the hydronephrosis no obvious kinking of the ureter could be recognised, but the tube curved away from the hilum in such a way as to make it appear likely that when the sac was distended the weight of the swelling might readily cause it to kink.

The pelvis was then slit open along its anterior wall sufficiently to expose the opening of the ureter, which was found to be guarded by a valve-like fold, composed of condensed fibrous tissue, and in appearance resembling an epiglottis. This process was split longitudinally, and the greater part of each lateral flap snipped away with scissors. Each raw edge was then folded over on itself and stitched to the wall of the pelvis with intestinal silk, and in this way the ureteral opening was freely opened out. A No. 8 red-rubber catheter with a terminal aperture, and with several lateral openings in the part which occupied the pelvis, was passed into the ureter and fixed in position by means of a catgut stitch. The redundant fibrous sac at the lower pole of the kidney was snipped away with scissors, and closed, save where the catheter emerged, by three tiers of silk sutures introduced after the manner of a Czerny-Lembert suture used to close intestine. The kidney having been replaced, some iodoform gauze was packed into the wound, the ends being brought out along with the end of the catheter. The rest of the wound was then closed.

A considerable quantity of urine escaped into the dressings for some days, and as this did not show signs of diminishing, it was feared that the catheter had become blocked or that the ureter was again kinked, but as some indigo-carmine injected into the catheter immediately escaped in the urine passed from the bladder, it was evident that the channel was patent. The catheter was withdrawn on the tenth day. Gradually the quantity of urine escaping by the wound became less, but for fully six months there was a considerable amount of leakage, necessitating the wearing of a pad of absorbant wool. The fistula was now reduced to a tiny pin-point opening, from which a few drops of urine escaped from time to time. It was not until fifteen months after the operation that this finally closed.

Since the operation, two and a half years ago, the patient has been entirely free of pain; her general condition has improved in every respect, and she now leads a busy, active life in the enjoyment of perfect health.

THE VALUE OF NOVOCAIN AS A LOCAL ANÆSTHETIC FOR SUBCUTANEOUS USE.[1]

By J. W. Struthers, F.R.C.S.Ed., *Assistant Surgeon to Leith Hospital.*

There are now known a number of drugs, more or less closely allied to one another, which have the power of paralysing nerve terminals or interrupting the conductivity of nerve trunks so completely that they may be successfully used to induce local anæsthesia for operative purposes. The most recently discovered of these is a synthetic product which has been termed novocain. Various advantages over similar drugs have been claimed for it, and it has in a short time attained great popularity, particularly in Germany, where it was discovered, or perhaps one should say elaborated, by Einhorn, and is now prepared in the laboratories of a well-known chemical firm. During the last few months I have made use of novocain clinically for inducing local anæsthesia by subcutaneous injection, and as I have found that the claims made for it seem well founded, I thought it might be of interest to members of the Society if I indicate briefly the evidence which my experience has afforded. My remarks are based on some eighty-six cases in which I have used novocain and carefully noted the results, contrasting them with those obtained from the use of cocaine and eucaine in some hundreds of similar cases. These results have been uniformly good, and although the number of cases may seem a small one to base an opinion on, I am inclined to believe that novocain is at least of equal and probably of greater value as a local anæsthetic than cocaine or eucaine for subcutaneous use.

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[1] A paper read before the Medico-Chirurgical Society of Edinburgh, 4th December 1907.

In the first place, I may say that the drug is very soluble, and that its solutions are stable and may be repeatedly sterilised by boiling without in the least losing their power of inducing anæsthesia. I have tested this by making up a large quantity of a stock solution and using it over a period of several months, sterilising it over and over again during that time. The solutions combine well with solutions of adrenal preparations, and do not in the least interfere with the vaso-constrictor action of the latter.

For subcutaneous use, one requires, speaking generally, two solutions of a local anæsthetic—first, a relatively weak one for use in quantities up to several ounces, to produce anæsthesia by direct infiltration of the field of operation ; second, a relatively strong one for injecting into or round nerve trunks such as the ulnar or median nerves, to produce what is termed reginal anæsthesia in the area supplied by the nerve concerned.

For infiltration anæsthesia I have found that a solution of novocain in 0·75 per cent. saline solution of the strength of 1 : 400, plus 1 drop of the ordinary 1 : 1000 adrenalin solution to every 2 or 3 drms. of solution used, the strength of solution originally recommended by Braun,[1] answers admirably. It corresponds to what may be termed the standard solution for infiltration of 1 : 1000 cocaine, but has this advantage, that it may be used in larger quantities; for while the limit of safety is reached when about 4 oz. of the cocaine solution have been used, at least 6 oz. and probably more of the novocain solution may be used for an adult without any risk. In addition to this, it diffuses readily and acts as quickly as the cocaine solution, anæsthesia being satisfactory in ten to fifteen minutes after the injection is complete, and for this reason novocain is to be preferred to eucaine, for the latter may take as much as half an hour to take full effect. The duration of the anæsthesia is always more than an hour, often as long as three or four hours. After it has passed off, there is often, as with other drugs, a variable amount of burning and smarting pain in the wound, and I have seen no reason to infer that this is either greater or less than with cocaine, eucaine, etc. Sloughing of the skin, which occasionally follows the use of local anæsthetics, particularly, I believe, eucaine and stovain, I have never seen, nor have I seen it reported after the use of novocain.

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[1] Braun, "Die Lokalanästhesie," Leipzig, second edition, 1907.

I have used infiltration anæsthesia with novocain adrenalin solution of the strength indicated in the following operations:—

Tracheotomy, skin grafting, application of actual cautery, plastic operation on eyelid, exploration of sinus for foreign body, relief of paraphimosis. Removal of—testis, varicocele, tunica vaginalis for hydrocele, prepatellar bursa, olecranon bursa, carpal ganglion, fatty tumour, angioma, congenital mole, sebaceous cysts, varicose veins of leg, adenoma of breast, small subcutaneous fibrosarcoma, tubercular ulcers.

The list is, I think, fairly representative of the class of operations which may suitably be done under local anæsthesia with success. A number of them have been done several times, and the total number has afforded a satisfactory test of the efficacy of novocain for infiltration anæsthesia. Several of them, it may be mentioned, were done in children as young as 5 and 6 years of age. In no case was there any sign of toxic symptoms arising from the use of the novocain adrenalin solution.

For regional anæsthesia a 2 per cent. solution of novocain with 2 drops of 1 : 1000 adrenalin chloride solution to each drachm of solution used, is necessary when nerves as large as the median at the wrist or the ulnar at the elbow are being dealt with.

For anæsthetising digits by Oberst's method, the 2 per cent. solution may be used with perfect safety, but a 1 per cent. solution with adrenalin as before has been found quite strong enough to paralyse the relatively small digital nerves.

If a ring of this solution is injected round the base of a finger or toe into the subcutaneous tissue, the entire digit distal to the injection will be found anæsthetic in ten minutes. It was formerly the custom to apply a rubber band to the finger to localise the anæsthetising solution. The addition of adrenalin to solutions for inducing local anæsthesia, with the resulting anæmia and localisation of the anæsthetic action, has rendered the application of the rubber band unnecessary, and it is now never used.

The use of a local anæsthetic for anæsthetising digits by this method appears to me to afford perhaps as ready and accurate a method of comparing the relative strength of various drugs clinically as we possess, for the conditions in many cases are almost identical, and a given quantity of any drug can be accurately injected in each case and the effect easily watched and estimated.

While a $\frac{1}{2}$ per cent. cocaine adrenalin solution is strong enough to anæsthetise a digit completely in ten minutes, a 1 per cent. novocain adrenalin solution is required to ensure anæsthesia in the same time. While one would, however, hesitate to use more than 4 drms. of a $\frac{1}{2}$ per cent. cocaine solution, as much as 6 drms. of the 1 per cent. novocain solution may be used without any risk. In point of fact such a quantity of a 1 per cent. solution is rarely required.

It will be noted that the doses indicated have not been stated as so many grains or centigrammes of novocain, but in drachms or ounces of the solutions recommended for use. This has been done in order to emphasise the fact that in stating the safe dose of any local anæsthetic, the strength of solution used must always be indicated, for a given quantity of novocain, cocaine, or other drug is much less toxic in a weak than in a strong solution. The actual amount of novocain suggested as the maximum dose in 1 per cent. solution is just over 3 grs., while the amount in the $\frac{1}{4}$ per cent. solution is over 6 grs.

As regards the use of novocain for inducing regional anæsthesia, I have used it with success in opening whitlows of all degrees of severity, for the removal of ingrowing toe-nails, of subungual exostosis, for the treatment of hammer toe by excising the head and part of the shaft of the first phalanx, for amputation of fingers at and distal to the metacarpo-phalangeal joint, for removing needles and other foreign bodies embedded in the hand or fingers, for the cleansing and stitching of severe lacerated wounds, etc.

It has proved as satisfactory for regional as for infiltration anæsthesia, and, in conclusion, I may say, that I believe the advent of novocain marks a real though perhaps slight advance in the possibilities attending the use of local anæsthesia by subcutaneous injection. It is stable, readily sterilised, unirritating, and efficient as a local anæsthetic when combined with adrenalin, and can apparently be used in doses to meet all requirements without any fear of serious toxic symptoms arising.

CANCER ORIGINATING FROM BARTHOLIN'S GLAND.

By James M. Graham, M.B., F.R.C.S.Ed.

Although cancer occurs so frequently in the female sexual organs, it is relatively uncommon to find it affecting the external genitalia. It has been shown statistically by Gwilt that out of 7479 cancerous tumours of the sexual organs of the female, only seventy-two, or 1 per cent. of these, were vulvar; and when the latter cases are analysed, the greater proportion of them is found to occur in the form of surface epitheliomata.

In contrast to the usual type, the present case illustrates a rare form of cancer in this region, and a description of the facts may be of some interest and value.

Case.—*History.*—The patient, Mrs. S., æt. 45, was admitted to the Deaconess Hospital on 29th November 1907, being recommended by Dr. Douglas of Cupar. Her previous health had been satisfactory. She had four children. In regard to the present trouble, the patient stated that after the birth of her first child, nineteen years ago, a swelling formed at the entrance to the vagina on the left side. It was then about the size of a walnut, but gradually increased till two years ago, when it was as large as a moderate-sized orange. Dr. Douglas removed the swelling, regarding it as a large Bartholinian cyst. Fifteen months later he removed a hard lump, the size of a walnut, from the same situation, and the patient was then told that the disease showed a tendency to cancer. Three months later, Dr. Douglas removed some enlarged glands from the left groin, and these were reported to be epithelial cancer without cell nests. The present swelling showed itself four months ago. It has caused no pain, but has grown rapidly.

State on admission.—The patient is thin, but appears to be in good general health.

Local conditions.—On the inner aspect of the left labium majus and opposite the posterior end of the labium minus there is a swelling about the size of a small Tangerine orange; it is quite smooth and round on the surface, and gives superficial fluctuation. The mucous membrane is movable over it except where tacked down by scars of former operations; the tumour is not adherent to the pelvis. There is no surface change indicative of epithelial cancer. There is no appearance of return of the disease in the glands of the groin.

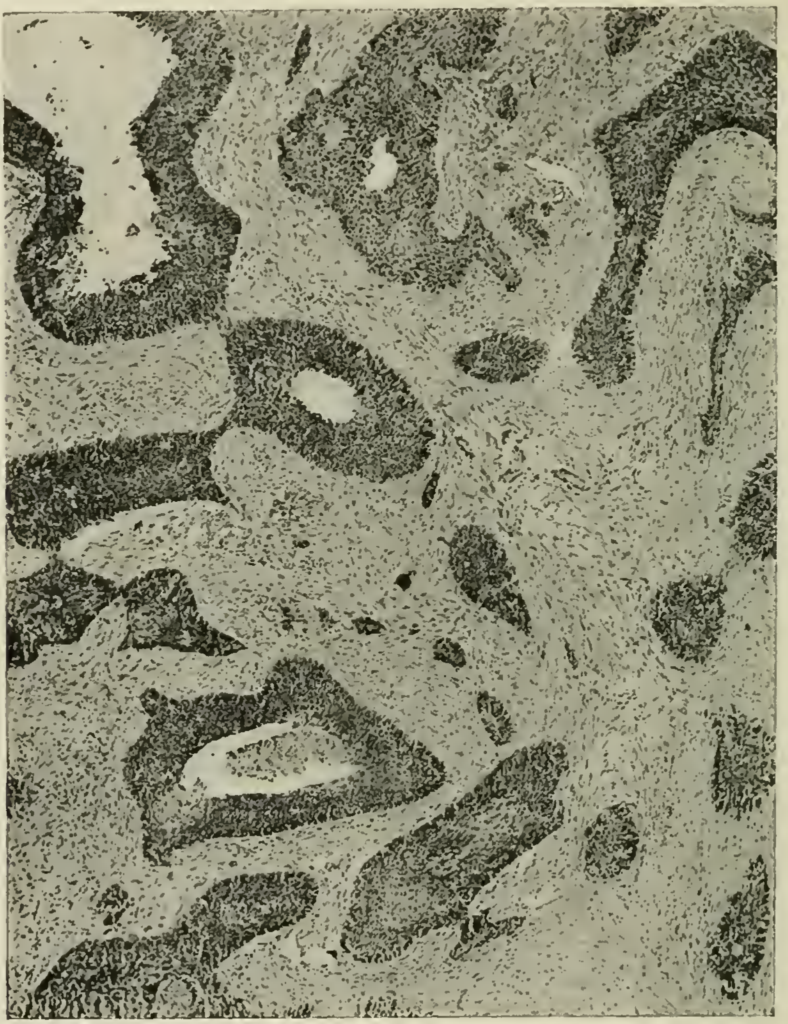
Operation.—Mr. Thomson operated on 30th November 1907, first drawing off some turbid yellow fluid, thus diminishing the size of the tumour to about half. The remainder of the growth was densely hard, and was freely excised, a considerable amount of normal tissue including the mucous membrane over it being taken away.

On section, the tumour was greyish-white in colour, and uniform throughout, except towards the surface, where there was a small irregular cystic cavity, about one inch in diameter, situated under the mucous membrane of the vulva. The rest of the tumour was firm and tough, and merged gradually into the fat and connective tissue which had been taken away along with the growth. The microscopical examination was specially important in this case, as the cancer was obviously not the usual epithelioma met with in this situation.

Microscopic examination.—A diffuse cancerous infiltration is present throughout the greater part of the specimen. The stroma consists of well-formed fibrous tissue containing only a few blood vessels, which are small and thin-walled. The cancer takes the form of long cords which pass irregularly throughout the stroma. These cords consist of closely packed masses of cells, which branch in various directions and send off numerous processes, which in some places have become detached in the stroma and form small isolated groups of cells extending into the deeper healthy tissue. The epithelial cells on the surface of the cords next to the stroma are in many places very distinctly columnar; these cells are narrow, long, and on the surface the protoplasm is clear, whilst the deeper part of the cell is occupied by a narrow, darkly staining nucleus. The subjacent cells are polymorphous in shape; a few are distinctly squamous in character, but the majority are smaller, with a round nucleus filling the greater part of the cell. In the centre the cells are more compressed, and in many cases are elongated, lying with their long axis in the direction of the cord. Whilst the smaller cords are solid, some of the larger ones show degeneration in their centres; the cell bodies there become granular, whilst the nuclei shrink and stain deeply or disappear, so that the epithelial mass may surround a space containing the débris of degenerated cells. These features were found in sections through the deeper parts of the specimen. Other sections were made, cut at right angles to the surface to show the relation of the cancer to the surface epithelium. Superficially the stratified epithelium of the vulvar mucous membrane is seen. This is wavy in outline and perfectly normal. Subjacent is a layer of areolar tissue separating the mucous membrane from the irregular cystic space previously mentioned. This areolar tissue contains numerous blood vessels, and is also quite normal. The wall of the cystic cavity is irregular and is composed of cells, six to eight layers thick, arranged in much the same way as those composing the epithelial cords. The arrangement resembles the appearance of transitional epithelium. Externally the cells are columnar or cubical, whilst the cells of the remaining layers are rounder and more compressed. The cells immediately adjoining the cavity are irregular and polymorphous, some being degenerated and separating off to form granular débris. Similar minute cystic spaces, probably ramifications of the larger one, are seen subjacent to it. An examination of the deeper portion of the cyst wall shows that it is definitely associated with the cancerous infiltration of the tumour; for, from this aspect, numerous branching epithelial processes pass into the dense stroma and form the cords already described. Invasion of the normal tissues can best be seen in the deepest part of the section, and occasionally the epithelial masses can be seen surrounding the blood vessels and invading their coats. At the limit of the cancer there is some small cell infiltration of the tissues. No glandular structure could be seen in any of the sections studied.

From the microscopical examination and from the clinical history, it is obvious that a cancer of fairly rapid growth was present. The character and arrangement of the cells suggest that it is of the nature of an epithelioma, differing from the ordinary squamous form by the entire absence of "epithelial pearls" or cell nests, and by the modified character of the epithelium, which is of the transitional rather than of the squamous type. The chief interest of the case is the problem, from which of the tissues of the vulva the growth has arisen. It must be remembered, from the outset, that a definite abnormal condition had been present, before the appearance of the cancer, in the form of a large Bartholinian cyst. At the same time it is necessary to consider other probable sources of the trouble.

There was no sign either clinically or otherwise of any surface change indicative of cancer in the skin or mucous membrane, and the absence of cell nests strengthened the exclusion of this origin. Similarly, had the growth commenced in the deeper layers of the skin or mucous membrane, or in the sebaceous glands or hair follicles, it would soon have spread to the surface as well as deeply, and would not have been separated from the surface epithelium by a layer of normal areolar tissue. Implanted epithelium or "embryonic rests" are possible causes of epithelioma, but there is nothing in this case to support these theories. Taking all the facts into consideration, it seems probable that the cancer developed in connection with the original Bartholinian cyst, some part of which, left after the first operation, had taken on malignant characters. In this connection it is important to know the histology of the Bartholinian gland and duct, and also of the cysts derived from it. The following short description of these structures is taken from a paper by Cullen. The duct, near its orifice, is lined by stratified squamous epithelium; nearer the gland the



duct lining is composed of transitional epithelium, many layers thick. In the deeper layers the cells are squamous in type, but in the superficial layer they are cylindrical. The secondary ducts in the gland substance are likewise lined by transitional epithelium, but the number of layers is less. The glands forming the lobules are tubular or slightly racemose, and are lined by one layer of high cylindrical epithelium; the cells, if filled with mucus, may be goblet-shaped. The connective tissue framework is rich in blood vessels and in non-striped muscle fibres. Cysts of Bartholin's gland may arise from distension of the main duct, or of the secondary ducts, in the latter case the cysts being smaller and usually multiple. Cullen has reported the microscopical appearance of the cyst wall in seventeen cases. The character of the epithelium depends on the point of occlusion of the duct. If this is near its orifice, the cyst wall is formed by squamous epithelium; if occluded nearer the gland substance, by transitional epithelium. Cysts formed in the small secondary ducts are lined by transitional epithelium, or by a single layer of cylindrical or cubical cells. The character of the lining varies at different places.

The appearance of the cyst wall in the present case resembles closely the above description, for it is lined by epithelium, arranged in layers of a transitional type, which confirms the supposition that it was derived from the original Bartholinian cyst. The fact that the cells next the stroma are mostly columnar indicates their rapid division, which is accounted for by the malignant change occurring in the cyst wall, from the deep part of which the epithelial processes invade the stroma.

A reference to the literature of the subject indicates how rarely cancer occurs in connection with Bartholin's gland; but although the number of cases recorded is limited, the form of the cancer is varied, and a brief note of some of the cases will illustrate this feature. In 1893, Schweizer analysed the cases which had previously been published, but found them so lacking in detail and microscopical evidence that definite conclusions could not be drawn as to the origin of the cancer. At the same time he described minutely a case occurring in a patient, æt. 58. When first seen there was a swelling about the size of a pigeon's egg in the situation of Bartholin's gland. A diagnosis of chronic inflammation of the gland was made. Three years later the swelling had increased to the size of a hen's egg, and was fixed to the surrounding parts. The duct of the gland was dilated and contained a bloody fluid. The microscopic examination of the growth showed the elements of the tumour to consist of masses of small polyhedral epithelial cells invading a dense stroma.

Frisch describes a different type of cancer occurring in a patient, æt. 77. The growth took the form of a reddish cauliflower-like mass about the size of a walnut, projecting into the vulva. The tumour had grown from the duct of Bartholin's gland, the gland itself being represented by a small cyst. The microscopic appearance was that of a malignant papilloma, resembling villous cancer of the bladder.

Kelly records the case of a patient, æt. 55, in which the cancer developed in connection with a large cyst occupying the left labium majus. The contents of the cyst were found to be cheesy, blood-stained débris; the cavity was stuffed with iodoform gauze, but showed no tendency to close; four months later a prominent tumour had developed in the same situation. This was necrotic, and had the structure of an adeno-carcinoma.

Trotta has also described a case, and gives the best account of the literature on the subject. He analyses ten cases, including Schweizer's, but excludes three on account of the meagreness of details. Of the remaining seven, one was cancroid in type, one was melano-carcinoma, and the others were adeno-carcinomata of the medullary or tubular type. While the majority of the cases has been in the form of adeno-carcinoma growing from the acini of the gland, it is obvious that other forms of cancer are relatively not uncommon, the variation in type depending on the particular part of the gland or duct from which the cancer originated. One feature that seems common to all the cases is the presence of a well-formed stroma, which probably delays the spread of the growth. The commonest age incidence is about the period of middle life, but cases have been recorded at the ages of 28 and 77. There are not sufficient facts to form a definite opinion about the prognosis of these cases after operation, but if the case is seen early enough and the inguinal glands are removed along with the tumour, there seems no reason to anticipate other than a satisfactory result.

I am indebted to Mr. Alexis Thomson for permission to publish this case.

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REVIEWS OF BRITISH AND FOREIGN LITERATURE.

A System of Medicine. By many Writers. Edited by THOMAS CLIFFORD ALLBUTT, M.D., and HUMPHRY DAVY ROLLESTON, M.D. Vol. III. Second Edition. London: Macmillan & Co. Ltd.

LIKE its predecessor in the first edition, the third volume of Allbutt and Rolleston's "System" deals with general diseases of obscure origin, and diseases of the alimentary canal and peritoneum. It has, however, undergone such complete revision as practically to constitute a new book, and therefore demands a lengthier notice than does the ordinary reissue of a text-book. The size of the volume has only been increased by some fifty pages, despite the addition of several important new articles, this desirable result having been attained by the omission of the chapters on acute rheumatism, sprue, diaphragmatic hernia, and gynæcological diagnosis, by the excision of some obsolete passages, and by a rearrangement of the paragraphing and typesetting of the pages. The principal changes in the arrangement of the articles are the transference of sea- and mountain-sickness from gastric to general diseases, and the relegation of peritonitis to the end of the volume. It will be of interest to compare, in some little detail, the various articles with the corresponding ones in the first edition.

In the opening chapters change is conspicuous. The old series of articles on chronic rheumatism, muscular rheumatism, gonorrhœal rheumatism, and rheumatoid arthritis has been replaced by rheumatoid arthritis, osteo-arthritis, spondylitis deformans, and the articular lesions of infectious diseases,—all from the pen of Dr. A. E. Garrod. The main feature of the new classification is to draw a definite distinction between two groups of cases—rheumatoid arthritis, and osteo-arthritis. The first is an acute, subacute, or chronic malady, in the early stage of which, at least, the lesions are chiefly periosteal and synovial, without the occurrence of osteophytes. Dr. Still's previous article on rheumatoid arthritis in children has been withdrawn, and is replaced by a description of the disease which bears his name, under the general rubric. Garrod is of the opinion that most probably the juvenile affection is essentially different from the adult variety, and that possibly it is tuberculous. In osteo-arthritis, all the joint structures are affected: here we are told to recognise as subtypes, Heberden's nodes, senile hip disease, and other localised arthritides, as well as generalised osteo-arthritis—the variety which most closely resembles rheumatoid arthritis. Under the general term spondylitis, both the types of Marie-Strümpell and Bechterew are described. Much more is known now than ten years ago about the joint lesions of infective diseases, hence we find accounts of gonorrhœal, dysenteric, syphilitis, pneumococcal arthritis, etc., and a note on the somewhat doubtful *rhumatisme tuberculeux* of French observers. Dr. Garrod is also responsible for a paper on intermittent hydrarthrosis, which has no counterpart in the previous edition. Mr. Bowlby's former paper on pulmonary osteo-arthropathy is now replaced by a new one by Dr. Batty Shaw, in which the much more common phenomenon of clubbed fingers is ably discussed. To explain both this and the full-blown arthropathy, Shaw adopts as most plausible Béclère's mechanico-toxic theory. Mr. Bowlby's paper on osteitis deformans stands with little alteration; a rather brief description of myeloma (Kahler's disease) is the chief addition made to his article on mollities ossium. Dr. Poynton (who also contributes an excellent account of achondroplasia, new in this edition) now collaborates with Dr. Cheadle in writing the paper on rickets. Except for a somewhat extensive rearrangement of the subject-matter, few alterations have been required. A note has been added on spasmus nutans, but we missed any references to recent work on tetany and laryngismus. The late Sir William Roberts' paper on gout has been brought up to date by Dr. Rose Bradford, a discussion of the rôle played by the purin bodies in the disease being the principal new topic introduced. Dr. Saundby's revised article on diabetes is particularly satisfactory; it gives a succinct account of the pathology of the disease, and the sections on treatment have been thoroughly modernised. The view held by Dr. Saundby on the relation of diabetes to obesity coincides very closely with that expressed by Carl v. Noorden. Dr. Bradford has revised, and made a few changes in, the pathological parts of the late Dr. Ralfe's monograph on diabetes insipidus. The articles on sea- and mountain-sickness stand without substantial amendment. The principal changes in the accounts of the pathology of secretion and digestion, by Dr. Rose Bradford and Soltau Fenwick, consist of references to the work of Pawlow, Bayliss, and Starling. Descriptions of secretin and entero-kinase appear for the first time, and a note of Mett's process of testing gastric activity is made. The account of the gases of digestion has been curtailed, without detriment to the usefulness of the chapter, but we think that a fuller description of modern gastric methods, and of the examination of the fæces, would have enhanced the value of the volume. An entirely new and satisfactory description of diseases of the mouth has been written by Dr. Spencer, and this is followed by Dr. Rolleston on diseases of the œsophagus—an article which has been revised in many minor details. Sir Lauder Brunton has added a paragraph on hyperchlorhydria to his original paper on dyspepsia, and Dr. Soltau Fenwick has amplified his former article on indigestion in children by giving an account of cyclic vomiting. This interesting and obscure disease was worthy of a more elaborate inquiry. Dr. Clifford Allbutt has incorporated new ideas arising from Pawlow's work in his dissertation on neuroses of the stomach. It is characteristic of him that he should have been at pains throughout his articles to modify a phrase here, a word there, so as to make his meaning clearer. In his paper on dilatation of the stomach he accepts the view that acute dilatation is generally due to occlusion of the duodenum by the root of the mesentery. The late Dr. Dreschfield's monograph on gastric ulcer has undergone extensive change at Dr. Rolleston's hands. The sections on diagnosis and prognosis are almost altogether new, and fresh matter concerning pain, diaceturia, and pathology have been added. The treatment has been thoroughly brought up to date by a description of the various dietetic methods now in vogue. Few changes have been made in Sir Lauder Brunton and

Dr. Leith's article on gastritis, and the most important new matter added by Dr. Hale White to his paper on gastric cancer refers to the advances made in surgical measures for its relief. Professor Still has been entrusted with one of the chief new contributions, namely, that on congenital pyloric hypertrophy. The difficult question of medical and surgical treatment is ably discussed. Dr. Dreschfield's paper on duodenal ulcer has undergone little change, and although he has revised its details, Dr. Rolleston has not substantially modified his article on diseases of the small intestine. Sir Frederick Treves' papers on appendicitis, obstruction, and enteroptosis have been replaced by new ones from the hands of Messrs. Lockwood, Barnard, and Keith. Dr. Hale White has added a paragraph on intestinal spasm to the paper on colic, and has considerably extended that on colitis; the operation he now recommends for obstinate mucous colitis is rectal implantation of the ileum. Idiopathic dilatation of the colon deservedly receives much more notice than previously. Dr. Slater's excellent résumé of the bacteriology of the intestinal canal greatly improves the former paper on diarrhœa. Mr. Lockhart Mummery has added a page on sigmoidoscopy to the late Mr. Allingham's article on rectal diagnosis. The article on shock is new. Dr. Brodie does not distinguish between shock and collapse, and regards over-stimulation of the nervous centres and inspissation of the blood as the chief causal factors of both. The sections on peritonitis have undergone comparatively little change, but we must not omit reference to the very instructive description of the defensive mechanism of the peritoneum, and the indications a knowledge of its nature furnishes in regard to treatment, which Dr. Allchin and Dr. Andrews have written.

Evidently, therefore, the "System" has been very thoroughly revised, and since the new articles are of the same high standard as the originals were, we feel sure that the second edition will meet with as hearty a reception as the first did ten years ago.

Climatotherapy and Balneotherapy. By Sir HERMANN WEBER and Dr. PARKES WEBER. London : Smith Elder & Co.

IN Sir Hermann Weber's and Dr. Parkes Weber's "Climatotherapy and Balneotherapy" we have to welcome a work for scientific method and thoroughness which may be fairly said to represent the high-water mark of English literature on the subject. The volume is only in part a further edition of the authors' "Mineral Waters and Health Resorts of Europe," for to that standard work, much enlarged and greatly improved, have been added Sir Hermann Weber's climatotherapy and Parkes Weber's contributions on climatology in the "System of Physiologic Therapeutics."

The work is excellently planned. Part 1 deals with "Climatotherapy and Climatic Health Resorts," and includes a chapter on "Ocean Climates and Voyages." Part 2 has for its subject "Balneotherapy and Mineral Water Health Resorts," with special chapters on "Hydrotherapy in Chronic Diseases," and on "Localities for an After Cure to Spa Treatment." In Part 3 are considered indications for treatment—the use and selection of climates, mineral waters, and health resorts in chronic conditions. There follows an exhaustive bibliography and a very satisfactory index.

The matter is so detailed that anything like a comprehensive review is out of the question here. Briefly, the factors on which climate depends are first discussed, particular types are mentioned, and then a concise description of European and other health resorts is given. This survey is extended to European capitals and other towns. Passing to the subject of "Balneotherapy," the action of water at different temperatures is described, the constituents and classification of mineral waters receive attention, and an account given of their external and internal uses. The effect of a change of air, diet, and habits is defined, and the general course of spa treatment laid down. Particular waters—thermal, muriated, simple alkaline and muriated alkaline, sulphated alkaline, sulphated and muriated sulphated, chalybeate, sulphur, calcareous, simple gaseous—are noticed. The last section of the volume dealing with therapeutic indications will be of special interest to the general clinician; its scope includes individual morbid conditions and diseases. The specialist will admire the scientific spirit of the work, the clearly defined relation shown everywhere between physiological data and modern methods of treatment. In this respect the book marks a great advance in its department of therapeutics during recent years.

Diagnostics of the Diseases of Children. By LE GRAND KERR, M.D.
London: W. B. Saunders Company.

THE intention of this book is sufficiently explained by its title. It is an attempt to deal systematically with the semeiology of diseases of children. We cannot, however, regard it as a success. It is perhaps inevitable that in such a work the descriptions of disease should be rather stereotyped, but this is compensated for if the writer has had experience enough to have learned what symptoms are really important, and also what are the most frequent sources of error. Dr. Kerr does not appear to us to possess this; indeed, the volume gives evidence of being little more than a compilation—fairly well done, it is true, but not likely to prove of any great practical assistance. To illustrate our meaning, we shall select only one or two examples taken from diseases peculiar to children, concerning which, therefore, we have a right to expect useful guidance from a book bearing such a title. Pyelitis is said (p. 307), and quite correctly so, to begin with "repeated chills, a high and fluctuating temperature, and dimished secretion of urine." A few lines further down we read, "Up to this point many diseases will be suspected, but there is a marked obscurity about the symptoms," which renders the diagnosis of anyone unreasonable. Anybody, however, possessing the smallest expert knowledge of children's diseases ought to have pointed out that so far from these symptoms being obscure, the occurrence of chills or rigors in a young child is highly suggestive of pyelitis. They are as common in that disease as they are rare in others. How often, we would ask, has Dr. Kerr observed a rigor in a young child apart from pyelitis? Turning to pyloric stenosis (p. 114), we are told that "the character of the vomitus (without bile) should at once arouse suspicion." It is quite true, obviously, that in pyloric stenosis the vomited matters are free from bile, but so are they in many, many other conditions, and the diagnosis hinges on quite other points. Again, the vomiting does not begin within the first three days of life as a general rule. Among minor faults of this kind we may mention the omission, under intussusception, to refer to the disease most likely to be mistaken for it—acute ileo-colitis, and also the absence of any allusion in cyclic vomiting to the occurrence of acetonæmia and acetonuria. Save for amaurotic idiocy, there is no description of any form of mental defect—Mongolism, for instance, surely ought to have been mentioned—and the fact that amaurotic idiocy is practically entirely limited to the Hebrew race, is not stated. Pernicious anæmia is "less rare" than has been supposed; leukæmia is said to be "very rare." This is quite wrong. The number of recorded indubitable cases of pernicious anæmia in infancy and childhood is very small indeed, while leukæmia is at least as common, if not more so, in children as in adults. Judging from his own experience, the reviewer would say that at least five times as many cases of leukæmia as pernicious anæmia occur in childhood. The description of the blood in leukæmia, too, is absolutely inaccurate. There are numerous illustrations, chiefly of physical signs and methods of diagnosis, only a few depicting diseases. Even these are not satisfactory, *e.g.*, Nos. 158 and 159, showing cretins, are positively unrecognisable as such. We are sorry that we cannot speak favourably of this book, and we do not think that it will prove of any assistance to senior students of diseases of children.

The Treatment of Disease in Children. By G. A. SUTHERLAND, M.D., F.R.C.P. London: Henry Frowde and Hodder & Stoughton. (Oxford Medical Publications).

THIS may be confidently recommended as a useful guide to the treatment of sick children. Our only criticism concerns the opening chapter, on infant feeding. Dr. Sutherland, we think, greatly underrates the digestive powers of the healthy infant, so far as cow's milk is concerned. He recommends what we believe to be inadequate, or at least unnecessarily weak, milk mixtures for use during the earlier months of life. According to the table on p. 10, during the first month an infant receives only from 2½ to 3¾ oz. of milk in the twenty-four hours. In the next table modifications of milk by the addition of cream and sugar are given. Assuming that the cream collected according to the directions given contains about 20 per cent. of fat, the composition of the mixture recommended for babies up to 1 month old works out much as follows:—Proteid, 0·9; fat, 1·65; sugar, 4 per cent. This is very much the percentage composition of milk modifications used at the corresponding age in America, but we think that most physicians in this country find that such extreme dilution is unnecessary. Our own experience is that very few healthy infants are unable to tolerate milk diluted with only an equal bulk of water, while many can digest a stronger mixture, provided that due attention is paid to cleanliness and avoidance of bacterial contamination. Apart from this, we have nothing but praise for the book. It is based on Dr. Sutherland's own experience, and he does not trouble the reader with remedies which he has not himself found useful. One might single out many passages for notice, but a few must suffice. The sections dealing with acidosis are very good, and ought to bring the importance of this interesting condition before the practitioner's notice. The medical treatment of stenosis of the pylorus is fully discussed, and the responsibility which rests with the physician in deciding when he should hand a case over to the surgeon is thoroughly recognised. Dr. Sutherland has also laid great stress on the dietetics of disease, and his warnings against over-feeding children who are ill ought not to pass unheeded; it is probably as common an error as is grossly improper feeding. The book will be welcomed as a concise exposition of the principles of a subject of everyday importance.

A Manual of Venereal Diseases. By Officers of the Royal Army Medical Corps. London: Henry Frowde, Oxford University Press.

We have seldom reviewed a work with more genuine satisfaction than we do that now before us. Based as it is on that valuable publication, the Report of the Sub-Committee of the Army Medical Advisory Board of 1905, it reflects the mature opinions of the military experts on syphilology. Army surgeons have probably better opportunities of studying syphilis throughout its course than any other class of observers, as they have their patients more completely under control, and can therefore ensure their being kept under more continuous and systematic treatment than is possible in civil practice.

The Director-General, Sir Alfred Keogh, furnishes a short introduction, in which he indicates the various factors which, within recent years, have conduced to the diminution of venereal disease both among the civil population and in the army.

In a brilliantly written chapter on the "History of Syphilis and the Methods of Prevention," Lieut.-Col. C. H. Melville lays emphasis on the fact "that as temperance has increased (in the army), venereal disease has steadily diminished, and syphilis much more markedly than gonorrhœa." Quoting the final report of the Committee of the Advisory Board, he says that "in the United Kingdom an attempt to grapple with the problem of venereal disease by methods of compulsory isolation and treatment is neither practicable nor expedient." With regard to India, however, after considering both sides of the question, he concludes that there is no doubt the Cantonment Act of 1897 has had a good effect. A well-deserved tribute is paid to the valuable work of Col. Lambkin on the continuous treatment of syphilis in diminishing the number of men "constantly sick."

The chapter on "Pathology," from the pen of Col. Leishman, is of outstanding value. While making the proviso that complete proof of the causative rôle of the *Spirochæta pallida* in syphilis is not yet forthcoming, the writer admits that a very strong case has been made out in its favour. We have nowhere met with such an eminently clear and useful description of the organism, and of the methods of demonstrating it in the various lesions of syphilis.

The clinical aspects of syphilis are dealt with by Major C. E. Pollock. In this section the various methods of administering mercury are fully described and critically compared. We would draw special attention to the useful table giving the comparative values of the different methods, by the aid of which it is possible to continue the treatment consistently when circumstances necessitate a change of method, say from inunction or injection to pills, or *vice versa*. The results of treatment obtained by army surgeons must excite the envy of those who are called upon to treat the disease in the Lock wards of general civilian hospitals. It is to be borne in mind, however, that the soldiers of our standing armies are picked men in the prime of life, in good health, and of fine physique, and under such discipline that the conditions necessary to successful treatment can be enforced.

The subjects of gonorrhœa and soft chancre are less exhaustively dealt with, but the sections devoted to these diseases are full of sound practical advice.

While it is intended primarily for the army medical officer, we can most heartily recommend this small work to all who are interested in the subject of venereal diseases.

Prostatic Enlargement. By CUTHBERT S. WALLACE, B.S., F.R.C.S. Bacteriology by LEONARD S. DUDGEON, M.R.C.P. London: Oxford University Press.

MR. CUTHBERT WALLACE has the courage of his opinions, and in this work he endeavours to show that his opinion of the operation *total prostatectomy* by the suprapubic route is the correct one. For this it is necessary that anatomical facts should conform to his theories, and the opening chapters of this work are devoted to the surgical anatomy, morbid anatomy, and histology of the prostate. The results of castration and vasectomy have been summarised, he states in the preface, because the effects of these operations upon the testicle and prostate were but little appreciated. Chapter ii., however, on the experimental pathology and function of the genital glands, is defective and does not do justice to the results of the operations of vasectomy and castration which have been reported elsewhere. These operations have fallen into desuetude, not, as the author states, because they were valueless in cases of enlarged prostate, but because a more certain and valuable operation (prostatectomy) has displaced them. A useful division of prostatic enlargement into encapsulated and non-encapsulated forms is made by the author, and he very properly alludes to its significance from the standpoint of operation, but at the same time notes that it is difficult to recognise which exists in a patient before cystotomy. He does not explain how he concludes that only 15 per cent. of cases are non-encapsulated, and we believe, while this may be true of those cases in which prostatectomy has been performed, the actual proportion in prostatics is much higher. The portion of this work devoted to the operation, etc., of prostatectomy, Chapters vi. to x. inclusive, is rather commonplace, but in Chapter xi., in which Mr. Wallace discusses the nature of the enucleation operation, we think a good case is made out for the view which he advocates, a view which is supported by many surgeons, that a condensed or compressed layer of prostatic tissue is, as a rule, left behind after prostatectomy.

The author wisely does not enter into any personal controversy in regard to suprapubic prostatectomy, although throughout this volume one feels that he makes an endeavour to show that, as a rule, total enucleation is not performed. Mr. Wallace has done a piece of good work, and this book should enhance his reputation.

Essentials of Human Physiology. By D. Noël Paton, M.D., B.Sc., F.R.C.P.Ed. Third Edition. Edinburgh and London: W. Green & Sons.

This volume differs considerably from most text-books of physiology in the arrangement and mode of presentation of the subject-matter. It is written for medical students, who, faced by the inevitable examination and confused by the multitude of facts required of them, seek their material where it is presented in as succinct a form as possible, and where those parts of it which are of the most cardinal importance in medicine and surgery receive an emphasis distinguishing them from others which have less immediate bearing on their subsequent studies. It follows, therefore, that the book is in no sense a reference one for anybody wishing to dip deeply into any special study. Names of the originators of this or that theory are omitted except where custom has rendered it absolutely necessary that they should be mentioned. Histological methods, chemical tests, and experimental procedure are only touched upon lightly, and the reader is rightly referred for their details to practical work in the laboratory, which is alone capable of giving him a proper appreciation of them.

Illustrations are numerous and for the most part of a simple character; the diagrams are quite a distinguishing feature of the book, and explain in an admirable manner complicated processes such as the nutrition of tissues by the blood, and the mode of action of secretin and of the vagus nerve upon the secretion of the pancreas. An illustration conveys at a glance a meaning which no amount of verbal explanation can impart, and suitable figures of this kind are a great help to those who are reading the subject for the first time.

The book has been brought well up to date, and its bulk not much increased. The new protein nomenclature is adopted, and recent views on the digestion and absorption of proteins have been incorporated.

Text-Book of Organic Chemistry for Medical Students. By Dr. G. F. Bunge, Basel. Translated, with Additions, by R. H. Aders Plimmer, D.Sc. (Lond.). London: Longmans, Green, & Co.

Professor Bunge's work on "Physiological Chemistry" is so well known and highly thought of, that an English edition of his book on "Organic Chemistry" is a very welcome one. The medical student is apt to forget what little he learns of organic chemistry, and is consequently placed at a disadvantage when he comes to the study of the chemistry of the human body. Professor Bunge has come to his aid with a series of lectures upon the rudiments of organic chemistry adapted especially to the requirements of medical students. The most important subjects receive special attention, and are picked out of the immense mass of chemical details that render ordinary text-books on organic chemistry so hopeless to any one who has not had a thorough chemical training.

The translator has done his part of the work well, and has added material where he considers such necessary for the somewhat different requirements of English students. The additions in the text are enclosed in square brackets, so that one can readily distinguish them from the author's work. A few changes in arrangement have also been made. The book contains 242 pages, and an appendix on methods by the translator. The first lecture is devoted to a historical survey of the rise of organic chemistry during the last decades. Hydrocarbons are then considered: methane, ethane, and their derivatives come next. Glycerol and the fats, carbohydrates, glucosides, cyanogen compounds, urea and its derivatives, aromatic compounds, alkaloids and proteins, are among the subjects discussed in detail.

The work is much in excess of the requirements of medical students, but is strongly recommended to any one who wishes to obtain a thorough grasp of the subject. The translation is good, and the subject-matter contains, in addition to the necessary technical details, much that is of general interest.

NOTES ON BOOKS.

In *The Care of the Body*, the latest of Messrs. Methuen & Co.'s "New Library of Medicine Series," which is intended to place the views of modern scientific medicine before the public, Dr. Cavanagh deals in a most breezy and stimulating manner with the generalities of personal bodily hygiene and the commonplaces of everyday life. The subject-matter is treated in a manner which at times seems almost casual, but yet is throughout strictly reasoned and orderly; probably it is the best method of impressing on an age already over-burdened with undigested information, facts which, although many are well known, are neither properly appreciated nor acted upon. The different chapters deal with sleep, baths, exercise and training, fatigue, clothing, the skin, the hair, the teeth, feet and hands, light and ozone, the eyes, ears, nose, position and habit. Dr. Cavanagh is no great believer in artificial systems of training; he prefers walking or running to any of them as an exercise and developer of the body. The chapter on clothing is particularly harrowing; the function of clothes is to keep the body temperature at 98°·4 F., and, from this standpoint, fashions come in for much trenchant criticism. The last chapter is on "The Function of the Physician," and is the keynote of the whole problem—that it ought to be preventative, and not curative; and the sooner our social organisation adopts this view the better it will be for the race.

Dr. Robert Jones has published for the use of asylum nurses (and their teachers?) an excellent text-book on *Mental and Sick Nursing* (Scientific Press, London).

This work we can most heartily recommend. It gives the necessary physiological and psychological groundwork for a proper conception of insanity, without which the nurse's work can neither be so interesting for herself nor so satisfactory for the patient. Instruction is given, not merely in mental nursing, but also in the management of bodily disease, which should be of especial value for those nurses who have not had a previous hospital training. Without this knowledge a nurse can never hope to properly undertake the management of private cases. Nurses are perhaps born, not made, but, so far as any book can make them, this one will.

A Manual for Hospital Nurses, by E. J. Domville (J. & A. Churchill, London), would form a good introductory book for a nurse to read; the style is clear and interesting although inevitably rather condensed. It contains, firstly, a chapter on "A Nurse's Duties and Responsibilities," then a section on "The Nursing of Ordinary Cases," and one on "Emergency Cases, Operations, and Special Cases." Lastly, there is an appendix dealing with "Preparation of Remedies, Cookery, Measures, etc.," and a "Glossary of Terms."

Of Dr. Cullingworth's *Short Manual for Monthly Nurses* (J. & A. Churchill, London) little more need be said than that it is excellent—for the monthly nurse—but noting that it is not intended for the use of midwives.

The "Practical Medicine Series" (Year-Book Publishers, Chicago) has been already referred to in these Notes. Vol. vi. has now reached us. It is entitled *General Medicine*, but nearly half of the volume deals with typhoid and tropical diseases, the remainder being entirely devoted to the alimentary system.

While this series is published primarily for the general practitioner, at the same time the arrangement in several volumes enables those interested in special subjects to buy only the parts they desire. An attempt has been made in this volume of 343 pages—*The Eye, Ear, Nose, and Throat*, edited by Casey A. Wood, C.M., M.D., D.C.L. (Gillies & Co., Glasgow)—to review the literature on the subjects under discussion for the year previous to publication. This results in a book which is intended to furnish the practitioner with a ready reference to the most recent methods of examination and of treatment. For the specialist it is not of sufficiently wide scope to enable him to neglect his own reading. Considering these facts, we think notices of papers devoted to a description of rare cases, or to anatomical studies of purely academic interest, might have been omitted. On the whole, however, the editors may be congratulated on the results of their labour. A fuller index would make reference easier.

The object of this book—*Diseases of the Nose and Throat*, by B. J. Johnston, M.D. (Hodder & Stoughton, London)—is "to present in concise and practical form the diagnosis and treatment of the various diseases ordinarily found in the nose and throat." We are afraid that the most lenient critic could not be satisfied that this object had been attained. An undue amount of space has been devoted to illustrations of instruments and to prescriptions. The instructions as to methods of examination are faulty. The descriptions of the various diseases are not clear, and in some cases inaccurate, while the space is not well apportioned. Thus a chapter of three pages is devoted to so-called "Diseases of the Uvula," while "Paralysis of the Vocal Cords" is discussed in two pages and a line; and here we find the following remarkable statement: "Abductor paralysis is rather rare, is serious, and is usually a sequel of erysipelas, pneumonia, or typhoid fever." Further comment is needless.

Dr. Seymour Taylor has published his post-graduate lectures at the West London Hospital, *On Acute Pneumonia* (H. J. Glaisher, London), in pamphlet form. They give in comparatively few pages a good clinical study of this perennially interesting malady, and set forth in a suggestive way the indications which modern research affords as regards treatment of a disease which is probably more frequent, and certainly more fatal, than a generation back.

In many respects, *The Eddy* (W. Blackwood & Sons, Edinburgh) marks a distinct advance on Mr. Riccardo Stephens' earlier novels, although it is by no means free from the blemishes which marred these. It is a study of the career—the downward career—of a well-bred, well-educated doctor, driven partly by circumstance, partly by temperament, to practise as a parish medical officer in the Scottish Highlands. Ground between the upper and the nether millstones of a peculiarly snobbish set of shooting tenants and a peasantry thrifty even to avarice, Dr. Amory falls a victim to drink, and ends his days in pitiful fashion. The plot is slight, and Mr. Stephens has not the knack of enlisting our sympathy for his puppets: Battye, the well-intentioned, is a bit of a prig, the crofters are too greedy to live, and the Highland Provost's speech is an extraordinary jargon of lowland Scots. Amory's wife is well drawn, and the descriptions of sport are admirable. *The Eddy* is a much more serious work than any of Mr. Stephens' earlier romances, and though not a complete success comes within measurable distance of it.

Many a young medical practitioner fresh from the wards of the hospital is doubtless ill versed in the minor ailments of his patients, and it is with the object of meeting this deficiency that Dr. W. Essex Wynter has written *Minor Medicine: a Treatise on the Nature and Treatment of Common Ailments* (Sidney Appleton, London). "A chill on the liver," relaxed throat, sea-sickness, sprains, neuralgia, baldness, and other kindred affections are among the subjects dealt with. The book, which is written in a pleasing conversational style, gives a comprehensive account of the treatment of the minor ailments; there is not much said regarding diagnosis. We are not a little astonished at the length of some of the author's prescriptions, certain of which contain ten, or even eleven, ingredients.

It is manifestly impossible to do justice to the whole subject of general pathology and morbid anatomy in a manual of 285 pages; but in this small work—*Pathology, General and Special*, by John Stenhouse, M.B., and John Ferguson, M.D. (Hodder & Stoughton, London)—a praiseworthy attempt is made to give as much information as can be condensed into so small a compass. The text has been carefully written, and, as evidence that the reader will find no unnecessary padding, we note that the subject of anthrax is treated of in ten lines, and diseases of the pancreas in nine.

This book—*The Skin Affections of Childhood*, by H. G. Adamson, M.D., M.R.C.P.—fills a gap in pediatric literature, and supplies a long-felt want, which will be heartily welcomed by those interested in the subject. The little volume lays no claim to be an exhaustive treatise, but is simply a short practical epitome, written in a clear and concise manner, which should prove useful alike to the practitioner and the student. In a future edition the value of the work would be enhanced by greater space being devoted to the question of treatment and by a considerable addition to the number of illustrations.

The eighteenth volume of the *Transactions of the American Pediatric Society*, recently published, contains thirty papers read before the Society. Many of these papers are of more than average merit, but the one which calls for special notice is a paper on "Pseudo-leukæmia Infantum" (von Jaksch) by Koplik. The author considers that it is a secondary anæmia with or without leucocytosis, and that those cases reported as terminating in leukæmia were really cases of leukæmia from the outset.

As usual, the volume is excellently printed and well illustrated, and reflects credit alike on the editor and publisher.

Professor von Schrötter's old students, of whom there are many in this country, will find much to interest them in this little volume—*Hygiene of the Lung in Health and Disease* (Rebman Ltd., London) Written as one of a Health Series in Austria, the book covers the various aspects of lung hygiene in pleasant fashion. The original, with its chatty tone, is perhaps more characteristic of the author than is the translation. The latter, however, is sufficiently well done.

The structural and functional activity of the lungs is considered, and then the care of the healthy lung under extremely varying conditions of environment. The last chapter is devoted to diseases of the lungs, including the effects of inhalation of poisonous gases. The book, which was primarily addressed to a popular audience, contains shrewd hints which may be found of service even to the trained practitioner. The extent to which open-air measures may be practised is stated more guardedly than is accepted by most authorities in this country, but allowance has to be made for the difference in national outlook and custom. Altogether the book is one which ought to be of considerable service in helping people to keep their lungs in health and so exclude disease.

This—*Diseases of the Male Generative Organs*, by Edred M. Corner, F.R.C.S.—is one of the *Oxford medical Manuals*, and is an attempt to present a practical survey of the diseases of the generative tract, uncomplicated by a consideration of those of the urinary tract. There are numerous illustrations, which are more or less diagrammatic, but which have the merit of being simple and easily interpreted. The writing is clear in style, but seems too sketchy and incomplete to be of much value to either practitioners or students, and we have a difficulty in determining for what class of reader this work is intended.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF
J. S. FOWLER, M.D., F.R.C.P.Ed.,
PHYSICIAN, ROYAL HOSPITAL FOR SICK CHILDREN.

Sero-Diagnosis of Syphilis.

Wassermann's method of serum-diagnosis of syphilis, which has now been before the medical world for a good many months, has been very extensively investigated in Germany, and is, according to its supporters, almost as reliable as the Widal reaction is in the diagnosis of typhoid fever. Although the technique is yet far from being so simple as to be available in ordinary work, the method is of interest, not only in diagnosis, but as throwing light on the nature of the syphilitic infection, and as being a very strong, if not, indeed, direct proof that syphilis is the cause of tabes and general paralysis. In preparing this summary, reference has been made to the following papers:—Citron, *Deutsche med. Wchnschr.*, Leipzig, 1907, July 10; M. Wassermann and Meier, *ibid.*, August 8; Fornet and others, *ibid.*, October 10; Fischer and Meier, *ibid.*, December 26; Citron, *Berl. klin. Wchnschr.*, 1907, October 28; Weil and Braun, *ibid.*, December 9; A. Wassermann, *ibid.*, December 16; Bab, *München. med. Wchnschr.*, 1907, November 12; Butler, *Med. Journ.*, N.Y., 1907, November 30.

The serum-reaction depends on a modification of Bordet's method of fixing complement, which was discovered by A. Wassermann, who was by this means enabled to investigate diseases the infective agents of which are either unknown, or unobtainable as pure cultures. Instead of using bacterial extracts, he employed extracts of organs in which the virus is abundant: in this particular instance the livers of congenital syphilitic fœtuses. The principle underlying the reaction is well known to those familiar with the subject of immunity, and is as follows:—By introducing the red blood corpuscles of an animal of species A into an animal of species B, the serum of B gradually acquires the power of dissolving A's corpuscles when the two are mixed *in vitro.* Such hæmolysis depends on the existence in the serum of two substances,—amboceptor or immune body and complement. The amboceptor links the complement to the corpuscles, and lysis ensues. If the serum B is heated to 132° F. for half an hour, its complement is destroyed and it becomes inactive, but may again be activated by adding fresh normal serum, which naturally contains complement. The three substances—complement, amboceptor, and red blood corpuscles—are called a *hæmolytic system*, and when they are mixed hæmolysis occurs. Hæmolysis is a readily observable phenomenon, and it is obvious that its occurrence may be used as a reaction to test whether a hæmolytic system is present or not. Suppose that to a mixture of red blood corpuscles and amboceptor we add a fluid to be tested, the occurrence or non-occurrence of lysis will show whether complement exists in it or not. Wassermann utilised this fact thus: he devised a means by which the complement of syphilitic serum can be fixed, whereas that of non-syphilitic serum is not, so that the latter, but not the former, causes hæmolysis. The serum-reaction, therefore, is *positive when hæmolysis does not occur.*

To carry out the test the following must be prepared:—(1) *Antigen.*—For this an extract of the liver of a syphilitic fœtus is used. It is made by chopping up as fresh a liver as possible, and extracting it for twenty-four hours (with frequent shaking) with four times its bulk of normal saline solution, to which 0·5 per cent. of carbolic acid has been added. The extract is centrifuged, and the fluid, which ought to remain clear and sterile, is decanted. Some samples keep for months, others rapidly deteriorate. (In a later paper, Wassermann states that he hopes to be able to isolate antigen in a more stable form. It is probably a lipoid substance.) (2) *Antibodies.*—These are contained in the suspected tissue fluid, usually blood serum or cerebro-spinal fluid, milk, etc. It must be freed from red blood corpuscles by centrifuging, and from complement by inactivating at 132° F. for half an hour. (3) *Complement.*—Fresh guinea-pig serum, in a dilution of 1:10 is used. (4) *Hæmolytic serum.*—The serum of a rabbit which has been immunised against sheep's blood until a high degree of hæmolytic power has been attained, is used. A dilution of 1:1000 should lyse an equal volume of (5) *Corpuscles.*—A 5 per cent. mixture of washed sheep's corpuscles in 0·85 per cent. saline solution. In carrying out the test 1 c.c. of each of the five reagents is employed. The first step is to mix 1 c.c. of complement, inactivated serum, and sheep's corpuscles, with 2 c.c. of saline: that is, to prepare a hæmolytic system, and ascertain whether complete lysis takes place. Unless it does so, the materials, of course, are useless. If it is satisfactory, then 1 c.c. of antigen, 1 c.c. of complement, and 1 c.c. of the antibody (suspected serum) are mixed and incubated for three-quarters of an hour; the hæmolytic serum and the washed corpuscles are then added, and the whole incubated for a further period of two hours. If the suspected serum contain antibody (be syphilitic), the antibody and antigen together will have fixed all the complement, so that none will be available to complement the hæmolytic serum and lyse the corpuscle. Certain control tubes must also be prepared, *e.g.*, one with extract of normal liver instead of antigen, one with saline solution instead of suspected serum, and one with serum which has been proved to be syphilitic instead of suspected serum, etc. (For details, see Wassermann and Meier's paper.)

Such being the test, it is obvious that it can only be performed in a laboratory, and by an expert, but it is nevertheless of interest in several ways. In the discussion of Wassermann's paper three principal lines of argument appear—(1) In how far is the reaction definitely specific, and therefore of clinical value in diagnosis and treatment? (2) What light does it throw on the nature of the syphilitic infection? (3) What is its intimate nature? The last of these may be dismissed here with Wassermann's remark, that whether or not his explanation be the correct one, does not affect the main question of the clinical value of the test. That can only be settled by observation on patients, and if it should prove (as he anticipates) of diagnostic value, the exact mechanism of the reaction is relatively unimportant.

Most of the work done has been concerned chiefly with the diagnostic value of the test; its relationship as a guide to treatment, and as an evidence of the nature of the syphilitic infection, have usually been discussed only as side issues.

In Wassermann's last paper he states that about 1000 cases have now been tested and give fairly concordant results. Non-syphilitic persons *never* give the reaction, while about 85 per cent. of syphilitics do show it. The cases tested may be divided into two main groups, exclusive of the controls—(1) Patients suffering from syphilis, primary, secondary, tertiary, or latent; and (2) patients suffering from such diseases as tabes, general paralysis, aortic aneurysm, etc. Fischer and Meier report on the results of their examination of 114 cases of syphilis (eight primary, seventy-five secondary, eight tertiary, five old cases with no symptoms, four congenital, the rest doubtful or unclassified). All positive results were certainly syphilitic, and a positive result was got in 84 per cent. of cases. In the primary cases the reaction was negative in some instances during the first six to eight weeks, and then developed. In the recent secondary cases the five which gave on reaction were all at the beginning of the eruptive stage; in the late secondary series the negative cases (four) had all been very actively treated. All the tertiary syphilitics were positive, as were three of the four congenital cases. On the other hand, not all observers have got such decided results. Citron, whose own work has chiefly been on tabetics and paralytics, has compiled a table showing positive reaction in only 8 per cent. of primary, 26 per cent. of secondary, 21 per cent. of tertiary, 14 per cent. of early latent, and 11 per cent. of late latent cases. It is noticeable, however, that most of the early investigations have given a lower percentage of positive reactions than the later ones.

Turning to cases of tabes, aneurysm, etc., which are, of course, more important than the others, in which the diagnosis of syphilis is self-evident, it is interesting to note how uniformly a high percentage of positive reactions has been obtained. Wassermann and Plaut got positive reactions in thirty-two out of forty-one specimens of the cerebro-spinal fluid of general paralytics. Citron has made observations on eighty cases grouped as—(1) tabes; (2) general paralysis; (3) patients with a history of syphilis; (4) patients with no history, but with definite evidences of syphilis; (5) patients in whom syphilis could be excluded. In (1) thirteen were positive, two negative, and in one of these the cerebro-spinal fluid was not obtained, while in the other there was a possibility of lead poisoning. In group (2) all were positive. In group (3) nine were positive and six negative. In group (4) nine were positive, and one, a cirrhosis of the liver diagnosed as syphilitic on the strength of a history of two abortions, was negative. The last group all gave a negative reaction. In connection with groups (3) and (4), it is interesting to note that a positive reaction was less common among the former, who admitted infection, and had been efficiently treated, than in the latter, who did not know they had ever had syphilis, and had not been treated at all. Putting all Citron's cases together, we find that 77·5 per cent. of patients in whom the question of syphilis entered into the diagnosis, gave the reaction. In a series of thirty-nine miscellaneous patients tested by Meier and Wassermann, twenty-seven were positive, twelve negative. The diagnoses in the former were tabes, general paralysis, cerebral syphilis, dementia, congenital and acquired syphilis, and aortic aneurysm. The negative cases were pachymeningitis hæmorrhagica, alcoholism, mediastinal tumour, cerebral tumour, cirrhosis of the liver, tuberculous hemiplegia, etc.

Relation of the reaction to treatment.—This is not by any means clear. In syphilis of old date probably the occurrence of the reaction depends to a large extent on the efficiency of the early treatment. Citron grouped his cases according to the treatment they had received, with the following result:—Of twenty-six untreated cases, only one (and that a doubtful one) was negative; of seven which had received one injection cure, six were positive, and one (immediately after the cure) negative; of five who had undergone a course of inunction, three were positive and two negative; while of five who had undergone through treatment, four were negative and one positive. Speaking of recent cases, Fischer and Meier think that, on the whole, those which have been effectively treated less frequently give a reaction than those which have been neglected, but they do not regard it possible, so far, to judge from the presence or absence of a reaction whether the patient ought to undergo a further course of mercury. Sometimes, after an energetic inunction cure has caused all the symptoms to disappear, the reaction is as marked, or even more marked, than before. In the same way a negative reaction does not show that treatment is not needed. The point, of course, is that the test depends on the recognition of the antibodies to the virus, and these may be absent either because the virus has been destroyed, or because the tissues have not produced them in sufficient quantity; moreover, we do not know how long they remain in the tissues after they are no longer required. Fischer and Meier agree with Citron, however, that in cases of old standing, antibodies are generally present in inverse ratio to the effectiveness to the cure, and that under these circumstances a positive reaction indicates a fresh mercurial course.

Serum reaction in tabes and general paralysis.—A curious and not easily explained difference exists between the two diseases. Whereas in both of them the blood serum gives, as a rule, a positive reaction, the cerebro-spinal fluid in tabes rarely does, while that of general paralysis usually does,—in fact, the test is said to be almost pathognomic of the latter disease. Wassermann suggested that long years of antibody production on the part of the nervous system led to pathological degeneration from wear and tear, but this hypothesis seems to be disposed of by the infrequency with which antibodies occur in the cerebro-spinal fluid of tabetics.

Does the presence of antibodies show active syphilis, or merely a previous infection, possibly recovered from? We do not know how long antibodies remain in the body after they are no longer required, but it is not likely that they persist for years. In all probability, therefore, to find a positive reaction indicates active syphilis. It is known that after the cells have once begun to throw off antibodies, they tend to do so in increasing amount, and with ever lessening difficulty. Hence in old-standing syphilis a very mildly active process may stimulate the tissues to produce quantities of antibodies.

The most hostile critics of Wassermann's reaction are Weil and Braun, who deny that the antibodies are specific *quâ* lues, and think that their presence in general paralysis of the insane and tabes is merely an indication of a degenerative tissue change, not a proof of a syphilitic lesion. These observers, however, occupy an almost isolated position in respect of their opinions.

SURGERY.

UNDER THE CHARGE OF

ALEXANDER MILES, M.D., F.R.C.S.Ed.,

LECTURER ON SURGERY, SCHOOL OF MEDICINE, EDINBURGH.

Surgical Treatment of Infantile Paralysis.

Much has been done within recent years to improve, by surgical means, the weakened limbs due to the effects of acute anterior poliomyelitis. R. W. Lovett (*Am. Journ. Surg.*, N.Y., 1907, November) in a practical paper summarises these procedures. The damage inflicted on the motor cells in the anterior horns of the spinal cord in the acute phase of the disease is final, and cannot be repaired beyond a certain point. The peripheral nerves show changes similar to the degeneration following simple nerve division. The muscles show atrophy of the parenchyma with conversion to fibrous and even fatty tissue, but the nuclei remain, and this leaves a possibility of regeneration.

After the acute stage has passed off, there is a natural tendency to improvement, which must be favoured in every possible way. The weakened muscles must not be stretched by hanging or by pressure, and the foot should be secured in the right-angled position by a light movable splint. Massage and electrical treatment are of great value in this stage to stimulate the nutrition of the muscles and favour regeneration.

When the paralysis is fully established, there are two factors to be overcome: contraction deformity and loss of muscular power. The most common contraction deformity is that which results from shortening of the unparalysed muscles and stretching of those which are paralysed. As flexor muscles are, on the whole, less affected by the paralysis than extensors, flexion deformities are most common. The first step in treatment, before applying apparatus or performing transplantation of the tendons, is to rectify this deformity, by a series of plaster bandages, tenotomy, fasciotomy, or myotomy, as may be necessary.

After the deformity is corrected, the affected limb may be held in a proper position for walking by apparatus, or operative treatment may be employed to do away with the necessity for an apparatus. As the wearing of a cumberous apparatus throughout life is a serious handicap to the patient, operative treatment is to be preferred when at all possible. The hope of operative relief lies is the possibility of transplanting the insertions of non-paralysed muscles from a position where they are not needed, or are harmful, to a position in which they are useful to supplement or replace the action of the paralysed muscles. Each case must be carefully studied to determine which muscles are capable of regenerating to any extent, or can be made to take the place of those whose function is completely lost. This is best done by making the patient use each muscle voluntarily, and noting the extent of its action and power. The patient should also be examined while attempting to stand or walk, in order to determine the nature and extent of the deformity to be overcome. Electrical examination in this stage is not of great value, for muscles which are not sufficiently vigorous to be evident to the finger of the surgeon are not likely to possess much value when transplanted. The question to be solved is this : What good muscles are available to replace the paralysed ones, can they be spared from their proper insertions, are they nearly enough allied in line of power to make them good substitutes? The author gives a full description of his technique, laying particular stress on the importance of perfect asepsis, the use of the Esmarch bandage and a tourniquet, the employment of silk in preference to catgut for suture material, and the implanting of the tendon selected into the periosteum rather than into the tendon of the paralysed muscle. The periosteum is divided by a linear incision, the edges turned back, and a groove made in the bone deep enough to hold the tendon. The tendon to be transferred is laid in this groove and firmly stitched to the periosteum by two or three stout silk sutures passed on a strong curved needle. These sutures pass through both periosteal flaps and the tendon, uniting the whole into one mass. Muscles must be inserted on the stretch, and the foot should be held in an over-corrected position, so that the tendon is tight even in this position. The limb is fixed in a plaster of Paris splint, which includes the knee. Lovett is opposed to complicated operations in which tendons are made to serve more than one purpose. The best results, he says, will be obtained by the simplest operations. A piece of stout silk may be substituted for a tendon when it is too short to reach its insertions or when it must be lengthened.

The after-treatment is quite as important as the operation itself. The plaster bandage is worn for six to twelve weeks, the patient remaining in bed for two or three weeks. After this, daily massage and light exercises are employed, and not for at least six months after operation should any strain be put upon the new tendon.

Arthrodesis is only to be performed in cases of complete paralysis, and when tendon transplantation is not available.

Nerve transference has recently been employed, either alone or in combination with tendon transplantation, and promises to be of value.

THE VACCINE TREATMENT OF STAPHYLOCOCCAL INFECTIONS.

AN eminently practical paper on this subject is contributed by Hartwell and Lee of the Massachusetts General Hospital (*Boston Med. and S. Journ.*, 1907, October 17). As a result of their experience in 100 cases of localised surface infections with the *Staphylococcus aureus*, such as boils, carbuncles, and septic wounds, they state that it is not necessary in such conditions to prepare a vaccine from the identical organism of the lesion (autogenous vaccine), but that a "stock vaccine" of the staphylococcus may be used. This stock vaccine is prepared according to Wright's method, and put up in bottles of 50 c.c., each cubic centimetre of which contains 600 millions of dead organisms. A fresh stock should be made every six weeks, and should be kept in a cool, dark place. They have given up estimating the opsonic index before using the vaccine, having found that equally good results can be obtained without this preliminary. An initial dose of $\frac{1}{2}$ c.c. containing 300 million organisms is given,—four days later a full c.c. (= 600 millions); and the same dose is repeated every fourth day. As a rule, three or four inoculations will clear up a single focus. It may be necessary to give an inoculation every week for three or four weeks to prevent recurrence of boils. The inoculations are given deep in the subcutaneous tissues, preferably of the abdomen or back, avoiding points of pressure; and the site should be changed each time to avoid producing a local immunity. A few hours after the first inoculation, there is sometimes headache, backache, and lassitude, which pass off in twelve hours. There is no rise of temperature, no skin eruption, and no joint pains such as occur after the use of sera.

The first effect of the inoculation is to diminish the pain and tenderness. After twenty-four hours there is a profuse discharge, which continues till the focus clears up. If necessary, a small opening should be made to admit of easy exit for the discharge. Large openings are to be avoided. As antiseptics are believed to nullify the opsonins, they should not be used, sterile dressings being applied.

CARCINOMA OF THE ŒSOPHAGUS.

SEELIG (*Ann. Surg.*, Phila., 1907, December) reports a case of carcinoma of the œsophagus in a man, æt. 65, which illustrates the difficulty sometimes met with in distinguishing this condition from aneurysm of the aorta. A careful study of the literature of the subject shows that there is no one symptom characteristic of either of these conditions, and in a number of cases the true state of affairs has only been revealed post-mortem. Pain in the region of the scapula, neck, and upper intercostal areas, although more common in aneurysm, is sometimese qually marked in cancer of the œsophagus, and this is also true of dyspnœa. Even pressure on the recurrent laryngeal giving rise to intermittent attacks of hoarseness, which is said to be characteristic of aneurysm, may occur as a result of varying degrees of œdema in cases of œsophageal cancer. On the other hand, dysphagia is frequently a prominent symptom in cases of aneurysm. The X-rays do not always enable us to distinguish between them. In Seelig's case the sign which pointed most clearly to a diagnosis of cancer was that when the obstruction of the œsophagus was almost complete, the patient suddenly one day regained his power of swallowing. This was interpreted to mean that ulceration of the obstructing growth had taken place.

This case illustrated also the occurrence of multiple secondary growths along the œsophagus, and Seelig took the opportunity of studying the manner in which metastasis takes place along the œsophagus. He concludes that they may occur—(*a*) by implantation, (*b*) through the lymph spaces in the submucosa, (*c*) by extension into the œsophagus from a mediastinal metastasis, (*d*) by continuous growth above the lymph spaces of the mucosa, and (*e*) through the lymph spaces of the muscularis.

Physostigmine as a Purgative after Laparotomy.

Hippel (*Centralbl. f. Chir.*, Leipzig, 1907, November 16) confirms the observations of those who have found physostigmine the best drug for the excitement of peristalsis after operation. He gives the drug subcutaneously in 1 mgrm. doses, the first immediately after the operation, and then repeated doses every three hours till intestinal movements take place, these being recognised by the patient as a griping feeling in the abdomen. Then a rectal tube is introduced and left in for an hour or two, so that the gases may escape; this usually takes place on the same day as the operation. Sometimes one injection has proved sufficient; more frequently two or even four are necessary. On the day after the operation a glycerine enema is given and brings about the first evacuation. Hippel thinks this early excitement of peristalsis diminishes the tendency to adhesions, and also the meteorism, which is so dangerous after abdominal operations, both by favouring the occurrence of ventral hernia, and by pushing up the diaphragm and thereby interfering with the action of the heart and lungs. By getting the intestines to work early it is possible to nourish the patient earlier and better. He also agrees with Vogel that the use of violent purgatives before laparotomy is harmful, as it increases the atony thereafter.

Local Anæsthesia in the Setting of Fractures.

Conway, Reclus, and Braun have already worked at this, but not so extensively as Lerda of Turin (*Centralbl. f. Chir.*, Leipzig, 1907, December 1), who has done thirty cases without any drawback. It is essential that one should be able to recognise the exact seat of fracture. One then injects the fluid, using a syringe provided with a long, strong needle, injecting at different parts, firstly between the fragments and then round about them, so that the entire site of fracture, the marrow, periosteum, and surrounding tissues are infiltrated. He uses a solution of cocaine—1 to 200 salt solution, with one drop of adrenalin to every c.c. of the solution; he has used as much as 5 to 8 c.c. without untoward effect.

The best results are obtained in quiet patients, for in those who are nervous and anxious there may be difficulty. In six to ten minutes the anæsthesia is complete, the muscular contraction almost disappears, and one can proceed to the reduction of the fracture. Most of the cases were fractures of the lower end of the radius. The fractures of the elbow, apart from those of the lower end of the humerus or olecranon, are as a rule difficult to localise, so that he has not succeeded well with them. He does not think the method is applicable to fractures of the femur, except those immediately above the knee. It has been more successful in fractures and epiphyseal separations of the leg, and especially in those above the ankle.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

F. W. N. HAULTAIN, M.D., F.R.C.P.Ed.,

PHYSICIAN FOR DISEASES OF WOMEN, DEACONESS HOSPITAL, EDINBURGH;

AND

J. A. C. KYNOCH, M.B., F.R.C.P.Ed.,

PROFESSOR OF OBSTETRICS AND GYNÆCOLOGY, ST. ANDREWS UNIVERSITY.

Puerperal Inversion of the Uterus.

Cache (*Ann. de gynéc. et d'obst.*, Paris, 1907, October) has observed this condition twice in 4600 labours. It is most frequently of puerperal origin. It often results from improper pressure on the fundus after delivery or from traction on the cord to remove the placenta. Favouring factors for the production of inversion are too short a cord, precipitate labour, and adherent placenta. There are three degrees of inversion—(*a*) Simple depression of the fundus; (*b*) depression of the fundus as far as the cervical orifice; (*c*) complete inversion. The chief symptoms are pallor, hæmorrhage, pain, difficulty with micturition, debility, and inability to palpate the hard contracted fundus. Cache describes two cases in detail, both of them being successfully treated by reduction.

The Treatment of Dystocia from Pelvic Deformity.

Pinard (*Ann. de gynéc. et d'obst.*, Paris, 1907, September), as a result of eighteen years' experience at the Baudelocque Clinic, adopts the following conclusions:—(1) Never interrupt pregnancy whatever be the amount of pelvic contraction; (2) never perform any operation during labour which will involve pressure of the fœtal head against the bony resistance either at the brim or in the pelvic cavity. Of the operations suitable for pelvic contraction only Cæsarean section, symphyseotomy, pubiotomy, or Porro's operation are to be considered. By adopting one of those the mortality in labour may be very materially decreased.

Twenty-five Conservative Cæsarean Sections without Maternal Mortality.

Canton (*Ann. de gynéc. et d'obst.*, Paris, 1907, October) gives the conclusions he has arrived at from the experience of twenty-five cases. In contracted pelvis with a conjugate diameter of less than 7½ cms., with a living child of normal development, the operation will be absolutely indicated to save the child's life. The operation should be performed when the disproportion between the diameter of the child's head and pelvis does not allow of the delivery of a living child after several hours of vigorous contractions. In cases of fever or infection, pubiotomy is to be selected. In severe cases of eclampsia, Canton prefers forced labour to section. Contra-indications generally to the operation are—(1) Infection, (2) heart disease, (3) cancer, (4) tumours in general.

Attempts at Abortion in the course of Ectopic Pregnancy.

Guerdjikoff (*Ann. de gynéc. et d'obst.*, Paris, 1907, October) has observed three cases in which attempts had been made to produce abortion in what were supposed to be normal pregnancies. Each case ended fatally. In the first case pregnancy had advanced to about the sixth week, when the abortive measures were tried and infection resulted. In the second case five weeks had elapsed since the last menstrual period, when the attempt was made, resulting in tubal rupture and peritonitis. In the last case the abortion was attempted about the seventh week. Five days later rupture of the tube occurred, followed by peritonitis. In each case abdominal pains corresponding to uterine contractions with hæmorrhage occurred. At the post-mortem there was found marked endometritis, from which infection had spread to the sac of the extra-uterine gestation.

Rupture of an Ovarian Cyst during Pregnancy, followed by Severe Internal Hæmorrhage.

Morestin (*Ann. de gynéc. et d'obst.*, Paris, 1907, October) reports the following case:—P., æt. 30, was admitted to hospital collapsed. She was about four months pregnant, and there was considerable abdominal distension. Immediate operation showed a ruptured cyst, growing from the right ovary. It was of a dark violet colour, and showed all the appearances resulting from a twisted pedicle. Two days later the patient aborted, and a dead macerated fœtus was expelled. The patient eventually recovered.

Forceps left in the Abdominal Cavity.

Stöckel (*Centralbl. f. Gynäk.*, Leipzig, 1907, No. 37) reports the case of a woman, æt. 22, who had abdominal section performed for intestinal obstruction and peritonitis eight months before coming under observation. Cystoscopy and Röntgenography revealed a pair of pressure forceps extending to one-half its length into the bladder. The forceps were extracted by colpocystotomy and a resulting fistula was subsequently closed.

The Extended Abdominal Operation for Uterine Cancer.

Wertheim (*München. med. Wchnschr.*, 1907, No. 27) reports on 120 cases operated on more than five years previously. Recurrence took place in fifty-three of eighty-seven cases kept under observation, but 61 per cent. of all cases operated on had remained free of recurrence for five years. The absolute percentage of cures was 25·6 per cent., and only twenty-four of those could have been operated on by the vaginal route. There were sixty more cases free from recurrence for four years, and two-thirds of those at the time of writing were well. Wertheim claims 32 per cent. of absolute cures. Those results he attributes to increased skill in operating, and the avoidance of accidental injuries. The duration of the operation on an average is one hour. Wertheim does not use gloves except in septic cases.

Arrest of Hæmorrhage after Labour.

Brock (*Practitioner*, London, 1908, January) refers to the lack of unanimity of opinion regarding the important question of the physiological arrest of post-partum hæmorrhage. He considers the teaching expressed in obstetrical text-books as unsatisfactory, because it gives no information as to whether in post-partum hæmorrhage the bleeding is arterial or venous. Those who recommend aortic compression for the arrest of the hæmorrhage do so to control the arterial supply of the placental area. Brock believes that the bulk of the blood in post-partum hæmorrhage flows from the maternal sinuses through the uterine veins by a backwash from the inferior vena cava. He points out that the maternal sinuses are situated in the superficial layer of the uterine mucous membrane, internal to the muscular layer, and therefore not directly acted on by the latter as is generally taught. The blood in post-partum hæmorrhage is invariably dark venous and does not pulsate, but in bad cases comes away in "an appalling torrent," unaffected by the direct hæmostatic power of the uterine muscular fibres. The treatment of severe cases resolves itself into the prevention of regurgitant venous hæmorrhage. This may be accomplished—(1) By direct pressure applied to the bleeding sinuses. This may be carried out by introducing one hand closed into the vagina, while with the other the fundus of the uterus is pressed down on it, through the abdominal wall. (2) By elevating the pelvis and compressing not the aorta but the inferior vena cava. This method of arresting hæmorrhage depends for its success on compressing the inferior vena cava, and in this way stopping the backwash of blood from the latter.

THERAPEUTICS.

UNDER THE CHARGE OF
RALPH STOCKMAN, M.D., F.R.C.P.Ed.,
PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY;
AND
FRANCIS J. CHARTERIS, M.D.,
ASSISTANT TO THE PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY.

Radium as a Treatment of Lupus and Cancer.

Morton, without in any way claiming that radium is a universal cancer cure, states that in certain cases it gives good results. In actual practice he finds it superior to the Röntgen rays, provided that a pure radium salt is used. The advantages of radium are that it can be accurately dosed. By using a standardised pure radium bromide of known radio-activity, the effect can be expressed in terms of a time unit, since the radio-activity is constant. The gamma rays of radium have greater penetrating power than X-rays, giving as a result a deeper and wider action. By enclosing the radium in suitable receptacles, it is possible to utilise the beta or cathode rays, which is not possible with an X-ray treatment. These facts would indicate that it is quite possible that the therapeutic effects of radium treatment may differ from those obtainable with Röntgen-ray treatment. In actual practice this is clearly brought out. In lupus, for example, the action of radium is much more rapid than that of the X-rays. Morton considers that radium constitutes the best modern treatment of lupus vulgaris. He uses Lieber's aluminium tubes containing 10 mgrms. of radium bromide of an estimated radio-activity of 1,800,000. These tubes are highly active. A tube placed upon the skin for twenty minutes produces a radium burn appearing within from four to fourteen days, and usually proceeding to a secondary stage of serous exudation. In using these tubes, he employs either a gradual method of frequent consecutive treatments of short duration extending over several weeks or months, or an aggressive and rapid action by using the radium for from one to six sittings each with an exposure of from twenty minutes to one hour or more. In the latter case a severe burn is produced, but the sound tissues heal with excellent cosmetic effect, while the cancerous tissue is destroyed. Sound or healthy tissue is much less affected by radium than cancerous tissue. As a rule, the radium tube is covered with a thin gelatin tube, and is laid directly upon the spot to be treated for a certain time. In selected cases the radium tube is embedded in the tumour either after puncture with a knife or with a Keye's cutaneous punch. By this means the tumour receives the full activity of the emanations. Normally the skin absorbs about one-half of the radiant energy during its passage. When the radium is embedded a silver cap may be used to protect the overlying unaffected skin. In this way very severe treatment may be applied to a large tumour mass without any risk of acute dermatitis. In addition to this local treatment, Morton employs internally a solution of fluorescin, esculin, or quinine, in order to excite these fluids to fluoresce in the cancerous tissues during the radium treatment. Further, he uses radio-active water. He insists that to obtain good results a pure radium salt should be used, since impure salts absorb to a large extent the radiations which are therapeutically active. Less active tubes can be used for embedding. In illustration of these claims he describes a number of cases. The most remarkable was that of a large spindle-celled sarcoma of the upper arm, which was treated more than two years ago by embedding and fluorescence with fluorescin and quinine sulphate. Before treatment was commenced the burn had already undergone spontaneous fracture, and required a splint for support. The embedding treatment produced rapid improvement, so that at the end of a month the splint was dispensed with, and in the course of two months the disease was so far checked that the patient was dismissed, having gained 17 lb. in weight. The cure has been maintained for over two years, so that it is likely to be permanent. None of the other tumour cases was quite so striking as this, but several of the records show that the local use of radium is decidedly beneficial in cancer and lupus.—*Med. Rec.*, N.Y., 1907, November.

Intravenous Injection of Strophanthin.

This treatment has recently been advocated in acute cardiac failure as affording the most rapid relief. Baccelli now recommends the similar use in cases of severe paroxysmal tachycardia. He describes one case in which the heart rate was over 250, with an uncountable radial pulse, in which the effect of three injections of 1 mgrm. strophanthin was to reduce the rate to 80 beats per minute, along with the disappearance of all associated symptoms. The drug was continued in ½ mgrm. doses daily, as long as any tendency to cardiac irregularity persisted. Baccelli considers that the disease is a neurosis, not of the vagus nerve, but of the intracardiac ganglia.—*Gazz. d. osp.*, Milano, No. 80, 1907.

Röntgen Ray Treatment of Tuberculosis of the Genito-Urinary Tract.

Bircher points out that tuberculous disease of the genito-urinary tract has become much less fatal since it has become possible, by the finer methods of cystoscopic examination, to classify and select the cases better for surgical treatment. Cases which cannot be treated by the surgeon uniformly do badly with internal medical treatment. With unilateral localised lesion nephrectomy affords permanent relief in a large percentage of cases. Recently Bircher has obtained good results with the use of Röntgen rays in two cases of widely spread tuberculous disease of the kidneys and bladder, in which surgical treatment was declined. In the one case both kidneys were implicated, in the other the disease involved only the one kidney, but in both cases the bladder was secondarily infected. By prolonged X-ray treatment rapid relief was obtained. In one case the arrest of the disease has now lasted for more than three years. In the other, there was a slight recrudescence after two years, but this has again disappeared under renewed ray treatment. The treatment consisted in raying the renal region with the patient lying on the abdomen. A medium hard tube was used, and the exposure lasted for twenty minutes daily, with the tube at a distance of 20 to 25 cms. In each case, after four or five weeks' treatment, irritation of the skin necessitated a cessation of the treatment for a time. The effect of the treatment was rapid. The urine improved in appearance, and tubercle bacilli, pus corpuscles, and cellular structures disappeared. The frequency of micturition and pain were rapidly relieved, and the patients gained in weight.—*München. med. Wchnschr.*, No. 51, 1907.

MEDICAL JURISPRUDENCE.

UNDER THE CHARGE OF

HARVEY LITTLEJOHN, M.A., B.Sc., M.B., F.R.C.S.Ed.,

PROFESSOR OF FORENSIC MEDICINE, UNIVERSITY, EDINBURGH.

The After-Effects of Carbon-Monoxide Poisoning.

A case of great interest in connection with employers' liability for compensation has been recorded by Lewin in the *Berl. klin. Wchnschr.*, 1907, No. 43.

On the 15th of November 1904, several women who worked as ironers were overcome by the fumes which had escaped from the stove in the room where they worked. The poisonous gas was proved to be CO, and at the time of the accident the exhaust fans were not working. Several women suffered from acute symptoms of poisoning, but the complainer, in connection with whose case Lewin was requested on behalf of the State Insurance Office to give an opinion, showed no symptoms at once, and indeed was able to afford assistance to her less fortunate fellow-workers. On the way home, however, the complainer became unwell, and vomited twice. On arriving at her house she complained of severe headache, vomiting, and faintness. A doctor was called in, who, in addition to the above symptoms, found weak action of the heart, a small intermittent pulse, and feeling of coldness of the hands and feet. The next day the insurance doctor found no objective bodily symptoms, but she still complained of headache, weakness, and giddiness. These symptoms continued, and she was treated in a hospital from 5th December to 21st February 1905, where the physician stated he was unable to detect any objective diseased condition. The complainer's demands for compensation were thereupon refused. The case was remitted by the State Insurance Office to Lewin for his report in October 1906. He found on examination that the complainer still suffered from headaches, situated especially in the occipital region, and that she complained of a restlessness which prevented her working for any lengthened period at one time. She looked pale and delicate, but there was no objective sign of illness except marked rapidity of the pulse, which was found to beat 125 to 130 to the minute. There was also great swaying of the body, with closed eyes and the feet placed together. The pupils reacted normally as well as the other reflexes, and in other respects she appeared to be perfectly healthy.

Lewin analyses carefully the history of the illness and circumstances in which the poisoning took place. The fact that the complainer did not immediately have symptoms of poisoning, he shows, is quite consistent with what we know of the action of this and of other poisons; and in this respect negatives the view expressed by the insurance doctor, namely, that "if no acute symptoms develop while a person is in the poisonous atmosphere, then no permanent effects of such a poisoning can appear subsequently." Lewin shows that it is common for persons exposed under similar conditions and at the same time to an atmosphere containing excess of CO, to be affected to markedly different degrees. He relates in this connection the case of a married couple who at the same time and under similar external conditions suffered from the effects of the gases escaping from a stove. The woman had very few symptoms, and was soon convalescent, while her husband became blind and insane. A somewhat similar instance was that of the death of Zola and his wife. The cause of this difference in action in such cases may be accidental, such as one person being nearer a draught of fresh air, or it may depend upon the depth and frequency of the respirations of the individual; or again in persons who have been exposed to the presence of CO gas for a long period, as, for example, in certain employments, there may be possibly an increased or diminished susceptibility to suffer from its effects. Even when the exposure to the gas has been very short, similar differences in the effects produced may be observed, as in the following very striking instance.

Three workmen inspired CO for only a few seconds. Two of them suffered from giddiness and headache, but recovered on being taken into the fresh air. The third went to a doctor, complaining of sickness and shortness of breath, which was relieved by inhalation of oxygen. During the next few days he worked as usual. Twelve days later he again went to the doctor and said he had had symptoms of dyspepsia, vomiting, and a cough, all of which had disappeared again, but that now he was suffering from pains in the hips. These pains persisted for many months, and were accompanied by marked pallor and weakness of the patient.

Lewin states, as these cases indicate, that even slight cases of poisoning may be followed by prolonged symptoms of illness, and he controverts the opinion of Charcot and his pupils, that the symptoms in such cases are often merely the outcome of a previously existing hysteria. In the case under comment, Lewin gave it as his opinion that the complainer was totally unfit for work from the date of the accident until the 21st of February 1905, and from this date until the end of the year her working capacity was diminished by 25 per cent., while from this time up to the present it is still 20 per cent. below normal.

GANGRENOUS WOUNDS OF THE UTERUS IN CRIMINAL ABORTION.

THOMET and Paul have published in the *Ann. d'hyg.*, Paris, 1907, December, an exhaustive study of gangrenous perforation of the uterus following criminally produced abortion. They distinguish two varieties of perforation of the uterus in such cases, namely, simple perforation, that is, a puncture of the uterine wall in which the surrounding tissues are normal or only slightly altered, and in which the perforation is the dominant fact; and the medico-legal explanation offers no difficulty. The second is the gangrenous perforation. In these cases the wound is often very large, the edges are disorganised by intense gangrenous changes, and surrounded by a zone of necrosis. The cause of this second class is not so self-evident, and the medical jurist is faced with two possible explanations—either that the perforation preceded the gangrene and was the cause of it, or that the gangrene was the primary condition, and thus criminal intervention was not necessarily involved, or, at any rate, opinion as to an antecedent criminal act can only be offered with the greatest reservation. The authors have met with and describe, along with excellent illustrations, several cases of gangrene following criminally produced abortion, and state the following diagnostic characteristics of the condition:—

1. The patient is in a state of good health prior to the criminal act; and her illness dates from this, or occurs soon afterwards.

2. The expulsion of the ovum is not always noticed by the patient, but the interval between the operation and escape of the embryo is always remarkably short, never exceeding twenty-six hours, and in one case it was only four hours.

3. The pathological symptoms come on with a great rapidity, and often within twenty-four hours the patient may be in an extremely grave condition, jaundiced and suffering from acute septicæmic infection.

4. The clinical features are those either of general peritonitis or of metritis characterised by a fœtid, sanious, and foul-smelling uterine discharge. Icterus may be very marked; and in a case recorded by Maschka was such as to raise the suspicion of poisoning by phosphorus.

5. A sign of great practical and theoretical importance which is frequently found even within a short time of the criminal intervention, is the presence of a large perforation of the uterus, which is already undergoing gangrenous disorganisation.

6. The termination of the case, if left to itself, is always fatal, and as a rule this result ensues very quickly.

The authors discuss the characters of spontaneous rupture of the uterus post-partum, and those especially of spontaneous rupture occurring post-abortum and associated with gangrene. The former cases, while comparatively common, do not give rise to any medico-legal difficulties in connection with the question of criminal abortion, while with reference to the latter the authors have been unable to find any recorded case of spontaneous rupture of the uterus associated with gangrene in which there was not at least a strong suspicion of criminal interference.

The conclusions arrived at by the authors are—that manipulations with the object of procuring abortion sometimes cause a special complication regarded both from the pathological and from the clinical aspect, namely, gangrenous perforation of the uterus. No case of spontaneous gangrenous rupture of the uterus after a natural miscarriage has ever been recorded; while the differences between the condition resulting from criminal perforation and that occurring spontaneously during the puerperium are so distinctive clinically and pathologically that they cannot be confounded.

Fatal Case of Poisoning by Santonin.

In the *Vrtljschr. f. gerichtl. Med.*, Berlin, 1907, Heft 4, the case of a child, æt. 3½ years, is recorded, in which, after it had received at intervals during two days several "worm lozenges" containing santonin, a fatal issue ensued. The first symptoms noticed were restlessness and a gradual swelling of the face, especially around the eyes. The urine was yellow in colour with white flakes suspended in it, and it contained albumin. The condition of the patient grew worse, the symptoms being those of an acute nephritis. Death occurred on the fourth day. The urine gave a marked santonin reaction, and in addition to albumin there was present in it red blood corpuscles, leucocytes, hyaline and epithelial casts, and numerous epithelial cells. Post-mortem the appearances found were—acute nephritis with blood extravasations; acute cystitis with hæmorrhages in the mucous membrane, together with an acute gastro-enteritis and ulceration of the cæcum; some extravasation of blood on the under surface of the dura mater in the region of the left frontal lobe. Owing to the small amount of santonin taken—a little over 1 grain in forty hours or about half of the maximal dose for a child of 2 years per diem—some doubt was expressed as to the death being due to santonin. Cases, however, have been recorded in which equally small doses have produced toxic effects, and although in the present case neither the symptoms nor post-mortem appearances were characteristic, Bienz concluded that the cause of death was santonin poisoning, and that a special susceptibility to the drug existed in the deceased.

Influence of the Daily Press as an Incentive to Suicide and other Crimes.

In a paper on the above subject, with which all must heartily agree, Mapes (*Med. Age*, Detroit, 1906, December 10) gives some striking statistics in regard to the increase of suicide in the United States. He states that whereas in 1891 there were recorded in these States 3531 instances of *felo de se*, in 1903 the number had increased to 8507. Of 77,617 suicides recorded in the country during the thirteen years commencing in 1891, 57,317 were men, but the increase has been chiefly amongst women, the proportion having risen from 5 to 1 to 2½ men to 1 woman. Of the above 77,617 cases, 61,933 used either poison or the pistol; previous to 1894 shooting was most in favour; since then poison has headed the fatal list. Of the rest, 6091 committed suicide by drowning, 2976 by hanging, 4447 used the knife, 809 were run over by locomotives, 763 precipitated themselves from heights, 294 sought death by fire, 77 used dynamite, and 227 employed various other methods.

ARSENIURETTED HYDROGEN POISONING.

JONES records (*Journ. Am. Med. Ass.*, Chicago, 1907, March 30) five cases which he met with as a result of the employment of the Macarthur-Forest cyanide process in the handling of low-grade gold ores. This process is extensively used, and has as its principle the solution of the gold values from the ore by means of a dilute potassium cyanide solution, and the recovering of the values from this solution by its filtration through zinc dust and shavings, which precipitates the gold, partly in the form of fine metallic gold, and partly as a double cyanide salt of gold and zinc. It was expected that cases of arsenical poisoning from this source would have been more frequent than is apparently the case, because arsenic is a common constituent of ores, and more or less of it passes into solution and is collected in the product; and, secondly, because it is a common impurity in the zinc and the sulphuric acid used in the refining of the product.

The author gives a careful summary of sixty recorded cases of poisoning by the gas, seventeen of which occurred amongst scientific men or students, fourteen amongst workers in metallurgical reduction works, and seven amongst workers in aniline dye manufactories. Ten were Italian balloon pedlars, who generated hydrogen gas from scraps of zinc and impure acid, and made their own balloons. Jones could only find one instance in which the poisoning arose from a similar process to that causing his own cases.

Arseniuretted hydrogen is stated to act differently from other arsenic salts, the principal organs attacked being the blood and the kidneys. The chief lesions consist of a rapid dissolution of the hæmoglobin content and actual disintegration of the red cells. In the kidneys there is an intense diffuse hæmorrhagic degenerative process involving the convoluted tubules most severely, and the glomeruli to a lesser degree. The jaundice which is present in all cases is probably of an obstructive type, though disturbed liver cell function also plays a rôle in its formation.

PUBLIC HEALTH.

UNDER THE CHARGE OF

J. BUCHANAN YOUNG, M.B., D.Sc. (Public Health),

ASSISTANT TO THE PROFESSOR OF PUBLIC HEALTH, UNIVERSITY OF EDINBURGH.

SUBNORMAL AND MENTALLY DEFICIENT SCHOOL CHILDREN.

IN an interesting communication on this subject (*N.Y. Med. Journ.*, vol. lxxxvi. No. 18), Dr. Newmayer, Philadelphia, puts in a very clear way some of the most salient points bearing on the mental and physical state of school children, and the necessity for the early recognition of physical defects causing mentally deficient, backward, subnormal, or morally retarded pupils. He considers the chief causes of mental deficiency and subnormal pupils are "fatigue, or chronic exhaustion; starvation; toxæmia; nervousness; defective vision; defective hearing; and defective speech," *Chronic exhaustion, or fatigue,* may be due to late hours, an important point being that the child may be required to work after school hours, and possibly late in the evenings. Such children are consequently unfit for their school work. The use of tobacco may also account for it.

Toxæmia.—Constipation in children produces an auto-intoxication, headaches, sleeplessness, and nervousness, which unfit the child for study. "Much harm is done by a teacher refusing a child permission to go to the toilet, especially if the child asks several permissions a day. The teacher should not be the judge in these cases."

Starvation, whether from improper or insufficient food, or from constitutional causes, impairing nutrition, is of great importance. A badly nourished child, or one who habitually comes to school without having had breakfast, cannot expend the necessary energy required for acquiring education. "A much needed reform in our educational system is the abolishing of all home exercises." If a child devotes five or six hours a day to school work it is taxed as much as its brain and physical capacity will stand. "The child should be devoting the after-school hours to healthful pleasure and exercise."

By *nervousness* the author means "that state of nerve unbalance that admits of inco-ordinated and useless movements." Severe nervousness is often due to reflex irritation, as from adherent prepuce, intestinal parasites, etc.; but there are minor causes, such as irregular meals, late hours, insufficient exercise, and too close application to reading or study.

Defective vision.—In this connection Dr. Newmayer considers it to be the duty of every physician, in the case of every child brought to him suffering from constant headaches, nervousness, indisposition, and dulness, to examine the eyes under a mydriatic for both refractive and muscular errors. These, if found, should be immediately corrected. "The medical profession," he says, "stands idly by and encourages the fake oculist work by neglecting to diagnosticate cases of defective vision in children."

Defective hearing.—Normal hearing is necessary for normal education. Perhaps the most frequent and most important cause of defective hearing in school children is acute or chronic disease of the middle ear. In Philadelphia, in 1904, there were found in the public schools by the medical inspectors 750 cases of middle-ear disease; and in 1905, 385 cases of middle-ear disease and 673 cases of defective hearing. The author ventures to say that "no small percentage of the cases reported and deaths from so-called cerebro-spinal meningitis are nothing more or less than cases of meningitis due to extension upward of an inflammation from an acute or chronic otitis media."

The classes as found in public schools at present are too large. From forty to sixty pupils under one teacher prevents proper education. The mentally deficients (as distinguished from imbeciles, who have no place in the ordinary school) should be placed in separate classes *in the same building,* rather than in a separate distinct school. The risk of special schools is that they will so degrade the children as to place a stigma on them for the rest of their lives. In these special classes the children should receive individual instruction from a resourceful, patient, and practical teacher, and should be returned to their regular classes as soon as sufficiently improved to continue with their classmates.

In conclusion, the author suggests that it should be enacted by law that every child on being enrolled into school should undergo a thorough physical examination, and accurate records of its condition should be furnished to the Educational Authority, especially as to condition of eyes, ears, and naso-pharynx. Any defect which would seriously interfere with the child obtaining a normal education should be corrected before the child is enrolled. "This thorough examination would avoid frequent examination from year to year."

THE ACTION OF SUNLIGHT ON PATHOGENIC MICRO-ORGANISMS.

WIESNER (*Arch. f. Hyg.*, München u. Leipzig, Bd. lxi. Heft 1, S. 1) has made numerous experiments to ascertain the varying conditions under which pathogenic organisms are killed by sunlight. He finds that the resisting power of the micro-organisms depends on the age of the culture. Cultures from seven to twenty hours old are most resistant. This maximum power of resistance is retained for several days, and then diminishes. Bacteria in a dried condition are less resistant than in a moist condition, the resistance depending to some extent on the medium in which they have been dried. A moist atmosphere absorbs a great number of the solar rays, and hence in a moist atmosphere the pathogenic organisms are less quickly killed than in a dry atmosphere. All parts of the solar spectrum have a bactericidal action. The strongest action is got from undecomposed light, and among the invisible rays the ultra-violet cannot act alone. The ultra-red are bactericidal. High temperatures assist the action of light as a bactericidal agent. The chemical actions of bacteria, *e.g.*, liquefaction of gelatine, are not enfeebled by light. Of course the different kinds of pathogenic organisms have varying resisting power to the action of light. In houses the disinfecting power of sunlight does not play a very great part, but in nature has a certain amount of importance. Certain sporadic and epidemic diseases, in which the respiratory passages are the *viæ* of entrance, appear to have an etiological relation with the degree of solar disinfection.

SERUM TREATMENT OF TYPHOID FEVER.

CHANTEMESSE (*Presse méd.*, Paris, tome xiv. No. 16) gives some statistics regarding the effects of antityphoid serum in the treatment of typhoid fever. During the last five years the mortality from this disease in the various hospitals in Paris averaged 17·3 per cent. in the 3595 cases treated. In the one hospital in which serum treatment of the disease is practised, the case mortality was only 3·7 per cent. 712 cases have been treated in this hospital, all with antityphoid serum, and only twenty-seven have proved fatal. Of these twenty-seven fatal cases, nine died from perforation and three from superadded pneumonia. In the cases in which perforation occurred, the serum treatment had been delayed, and it never occurred in patients in whom the serum treatment was commenced during the first week of illness. Practically the only drug given, apart from the serum, is calcium chloride, which is given towards the middle or end of the second week, to lessen the risk of hæmorrhage. None of the patients treated with the serum died from hæmorrhage. Chantemesse considers that the action of the antityphoid serum is due to the stimulation which it produces on the lymphoid system.

As bearing out the statistics of Chantemesse, Brunon (*Bull. Acad. de méd.*, Paris, tome lxx. No. 4) gives his results in the treatment of 100 children by means of antityphoid serum. The ages varied from 3 to 16 years, and the case mortality all over was only 3 per cent., as against 17 per cent. under other treatment. In the three fatal cases application of the serum treatment had been delayed, having been begun on the fifteenth, sixteenth, and thirty-eighth days respectively. Brunon considers that the serum has an undoubted effect in modifying the disease and greatly reducing the risks of complications.

DISEASES OF THE EAR, NOSE, AND THROAT.

UNDER THE CHARGE OF

P. M'BRIDE, M.D., F.R.C.P.Ed.,

CONSULTING SURGEON TO THE EAR AND THROAT DEPARTMENT, ROYAL INFIRMARY, EDINBURGH;

AND

A. LOGAN TURNER, M.D., F.R.C.S.Ed.,

SENIOR SURGEON, EAR AND THROAT DEPARTMENT, ROYAL INFIRMARY, EDINBURGH.

The Treatment of Acute Otitis Media by the Vaccine Method.

Magruder reports a case of acute middle-ear inflammation complicating influenza, which resisted ordinary antiseptic treatment for sixty-one days (*Laryngoscope*, St. Louis, 1907, November), but which was completely cured six days after the first injection of a vaccine. The patient was a man, æt. 42, suffering from influenza, who was seized with acute pain in the right ear. On the fifth day, a perforation of the tympanic membrane took place, and an abundant serous discharge followed. This contained almost a pure culture of pneumococci. No evidence of mastoid complication could be detected. The discharge was of a very stringy character at first, but afterwards became thick and yellow. The pneumococcus in pure culture was still detected. In spite of paracentesis of the membrane, the careful use of a variety of antiseptics, and due attention to the nose and naso-pharynx, the discharge continued. Bier's congestion treatment also failed to effect a cure.

Dr. Webb was consulted in order that the vaccine treatment might be adopted. Cultures of the pus were made in serum broth and plain agar, and an excellent growth of pneumococcus was obtained. The opsonic index was found to be 0·7. An inoculation of fourteen millions was made. For the first twenty-four there was an increase in the discharge; at the end of two more days, the discharge had almost entirely disappeared. A second inoculation of twenty millions was made, and at this time the opsonic index was found to be 1·1. Some days later the discharge had entirely ceased. The average dose of the pneumococcus is fifty millions. The advantage of the vaccine is exemplified in this case by raising the patient's resistance from 0·7 to 1·1. Several similar cases have responded equally well to the same method of treatment.

The Effect of the Continued Use of the Telephone upon the Organ of Hearing.

Blegvad has carried out a very extensive research upon the women engaged in the Telephone Exchange in Copenhagen (*Arch. f. Ohrenh.*, Leipzig, Bd. lxxi. Heft 1234). He comes to the following conclusions. In 26 per cent. of a total of 371 individuals examined with normal hearing, there was retraction of the tympanic membrane in the ear which was used at the telephone. In the other ear there was either no retraction or only retraction of very little importance. This anomaly of the drumhead he considered as probably directly or indirectly due to the use of the instrument. He points out further that the occupation of the telephone clerk does not lead to any diminution in the hearing power in individuals with normal sense of hearing. On the other hand, there is no demonstrable objective improvement in the hearing brought about, such as the telephone clerk frequently maintains to be the case. The ear becomes gradually accommodated, so that it is capable of appreciating better the words spoken through the instrument, probably because it becomes so accustomed to the various sounds which accompany the act that it ceases to take any note of them.

In other countries, more marked and permanent ear lesions have been observed along with neuroses in which the prognosis was unfavourable, due to adventitious noises or powerful currents in the telephone conduction. In Copenhagen, only a few cases of any permanent injury have occurred, and these have been due to powerful and sudden noises. Serious cases have not been met with.

The Attitude of Public Sanatoria towards Cases of Tuberculous Laryngitis, with Suggestions as to the General Plan of Treatment of such Cases in Sanatoria.

George L. Richards (*Boston Med. and S. Journ.*, 1906, August) draws attention to a point of considerable importance, when he says that there should be more community of effort between those who make a special study of pulmonary disease and those who work as laryngologists. He holds that it is time for the public sanatorium, and those who work on its behalf, to take more into account the laryngeal side of their cases of pulmonary tubercle, not only as regards treatment, but as regards early diagnosis, so that the two may work together to the greater benefit of the patient. There is a tendency in some sanatoria to discriminate against cases with laryngeal complication as regards admission, and in others there is no proper equipment for dealing with patients when such a complication arises. The writer draws attention to the fact that the State of Massachusetts has the largest and probably the best equipped tuberculosis clinic in the world. Statistics and carefully tabulated information on all phases of the tuberculosis problem should come from such an institution for the information and guidance of the profession. Its annual medical reports should be real contributions to the literature of the subject, and not, as now, a mere statement of the cases admitted, number discharged, arrested, improved, and not improved. Monographs should appear covering the question of diet, hæmoptysis, and the various medicines which are advantageous—in fact, the various phenomena of the disease should be regularly published as parts of such reports. If that were done in all sanatoria, a series of reports would be a valuable library on tuberculosis, useful to every physician. At least one of the resident physicians should be a trained laryngologist with a sufficiently good laryngeal technique to do whatever may be necessary in the way of treatment on minor surgical operations. The initial examination of the patient for admission should not be regarded as complete until a careful examination of the larynx has been made, and care should be taken in selecting the staff of the institution that a competent person is included. Until this is done, mistakes will be constantly occurring, and a valuable aid in prognosis and treatment will be lost.

Laryngeal tuberculosis occurs much more often at an early stage of consumption than is believed by the profession in general. It may attack a portion of the larynx, where from its situation no symptoms arise, so that it may be considerably advanced before any suspicion of its existence is aroused. Hence, a routine examination of the larynx is a very essential part of the conduct of all cases of the pulmonary tuberculosis.

The Removal of Laryngeal Growths in Children by the Direct Endo-laryngeal Method.

With the introduction of Killian's direct method of examining the larynx, operative treatment upon the larynx in the case of children has been much simplified. The parts are more easily inspected, and the difficulties in the use of the laryngoscopic mirror have been overcome. From time to time, papers dealing with the technique of the direct method are published, and a simplification in the various instruments required for the procedure is pointed out. Paterson (*Lancet*, London, 1906, July 26) describes the method which he has successfully employed for the removal of papillomata in children. Under chloroform anæsthesia, the child is laid upon its back, with the head hanging over the end of the table, and having a low pillow under the shoulders. Illumination is obtained by means of an electric head lamp with good illuminating power. The pharynx is brushed with 10 per cent. cocaine, and then the general anæsthesia is maintained through the tube of a Junker's inhaler hooked round the angle of the mouth. Killian's fish-tail tube spatula is then introduced into the mouth, and may then be placed in one of two positions: either on to the posterior surface of the epiglottis, the pressure there carrying that structure forward, and thus admitting of a good view into the interior of the larynx; or it is carried forward upon the base of the tongue as far as the anterior surface of the epiglottis and pressure exerted in that situation. Through the tube thus placed in position, the entrance to the larynx and the posterior surface of the epiglottis are painted with cocaine.

The parts being thus prepared, forceps are introduced through the spatula and the tumour tissue is grasped and removed. The forceps are provided with a long shank terminating in a beak with cutting edges. If the operation is carried out rapidly, the larynx can be fairly cleared before hæmorrhage becomes troublesome. Owing to the dependent position of the head the blood tends to run into the pharynx, from which it can be mopped out. When the growth is situated at the anterior commissure or in the subglottic space, removal is much more difficult. In the latter situation a curette may prove more serviceable, but the risk of inspiration of detached pieces of tissue must not be lost sight of. Considerable help may be obtained by getting an assistant to steady the larynx with his hand placed externally upon it. As a rule, not much chloroform is required to maintain anæsthesia, a matter of some comfort to the operator, as the expired chloroform coming out through the spatula inpinges upon his eye, and causes smarting and interference with his vision.

REPORTS OF THE MEDICAL SOCIETIES.

Edinburgh Medico-Chirurgical Society.—*January* 15, 1908.—Dr. James Ritchie, President, in the chair.—Mr. Caird showed a carcinoma of the stomach removed by Billroth's second method.—Dr. R. A. Fleming showed a case of spastic diplegia of infantile origin.—Mr. J. W. Dowden showed a patient after operation for perforated gastric ulcer, showing result of early complete suture of the abdominal wounds.—Mr. Caird showed—(1) A patient after removal of half of the tongue; (2) a patient with recurrence four years after enterectomy for malignant stricture of the colon.—Dr. E. Bramwell showed a case of (?) polioencephalomyelitis.—Mr. Alexis Thomson showed—(1) A case of osteoplastic amputation through the middle of the leg, in which a portion of the tibia was retained in the anterior flap, and brought into contact with the sawn section; (2) a boy, æt. 17, with deformity of the lower limbs and spastic paralysis following on Pott's disease, in which an attempt has been made on one side to restore the weight-bearing capacity of the limb by osteotomy of the femur, and transplantation of the tendons of the semi-membranosus and biceps into the patella.—Dr. Chalmers Watson showed two cases of chronic pancreatitis, one due to calculus in the common bile duct, the other to chronic catarrh of the pancreatic duct.—Mr. W. J. STUART showed the pneumatic sigmoidoscope.—Dr. CHALMERS WATSON gave a demonstration of the pancreatic reaction in the urine by the improved method of Cammidge. —Mr. J. W. DOWDEN read a paper on "Deductions from One Hundred Consecutive Operations for Appendicitis." The medical treatment of acute appendicitis is unsatisfactory. Among the causes he mentioned tonsillitis and carious teeth as of importance. The most important symptoms are pain, intermittent at first but afterwards becoming continuous; rigidity of the abdominal muscles, and the presence of painful areas over the appendix, near the umbilicus, and in other places. In speaking of the diagnosis, Mr. Dowden mentioned that all cases of acute and subacute indigestion should be examined locally. In severe cases, or where complications are present, any abdominal catastrophe may be simulated. It is impossible to diagnose the condition of the appendix or the degree of complication in an acute attack. The symptoms point to what has taken place, not to future complications. The prognosis is always serious, as it is impossible to foretell the course of any attack, however slight it may appear to be. The treatment is essentially surgical. The logical treatment is to remove the appendix as early as possible, and in every acute case the appendix should be removed within the first twenty-four hours. After the lapse of that period, the case should be carefully watched, and if no improvement in the symptoms is observed, operate at once. Of eighty-two acute cases operated on, sixteen died, and eighteen interval cases (survivors of acute attacks) all recovered. The earlier the operation in acute cases, the smaller was the mortality. If surgical aid is not immediately available, the patient should be put on starvation diet, the bowel washed out with saline, and local applications either cold or hot, whichever is more soothing to the patient, used till surgical aid arrives.—Dr. R. A. FLEMING gave a lantern demonstration on the changes in the optic nerve in a series of cases of intracranial tumours. The chief changes noted were hypertrophy of the neuroglial cells, there being no change in the mesoglial cells. This hypertrophy is not the result of pressure, as you may have grave changes from a small tumour which causes no intracranial pressure. The probable cause of the change is a toxæmia.

EDINBURGH OBSTETRICAL SOCIETY.—*January* 8, 1908.—Professor STEPHENSON, President, in the chair.—Dr. BARBOUR showed a specimen of telangiectatic fibroid tumour of the uterus, and Mr. BREWIS exhibited several specimens illustrative of cancer of the uterus and ovaries.—Professor Sir J. HALLIDAY CROOM read a paper "On Hyperemesis Gravidarum, with Notes of an illustrative Fatal Case." The patient was a primipara, and the cause of death attributed to exhaustion from the hyperemesis. Sir Halliday Croom classified the etiology of hypermesis gravidarum as being—(1) Reflex in origin (as in displacements, commonly backward displacement of the uterus, presence of ovarian tumour, hydramnios associated with twins, hydatidiform degeneration of the chorion); (2) neurotic or hysterical conditions; (3) resulting from absorption of toxæmic products. In considering what treatment should be carried out in such cases, in addition to the state of the temperature and pulse, the importance of a careful examination of the urine should always be kept in mind, inasmuch as once the toxæmic variety is recognised, the advisability of inducing abortion without delay must always receive due consideration.

Glasgow Medico-Chirurgical Society. — *Friday, January* 17, 1908.—Dr. Walker Downie in the chair.—Dr. W. S. Syme showed—(*a*) A patient operated on for septic thrombosis of the right lateral sinus consequent on middle-ear suppuration. The patient was a boy, æt. 10 years, and a point of interest was the absence of rigors. The jugular vein was ligated thirty-six hours after the primary operation. The patient did well. (*b*) He also showed two patients operated on for suppuration in the frontal sinus. In one, the superciliary ridge was left, while the bone above and the roof of orbit were removed. In the other, paraffin was injected to remove the depression, with very satisfactory results. He also referred to the methods of dealing with the sphenoidal sinus, and advocated getting into the sinus first and dealing with the ethmoidal cells after. (*c*) He then referred to a case in which a portion of a tooth had been lodged in the maxillary antrum for six years. It gave rise to pain on one side of the nose.—Dr. G. Burnside Buchanan read notes on a case of injury to the motor area of the brain.—Dr. A. N. MacGregor described a method of determining and recording the efficient outflow of urine in cases of stricture of the urethra. It consists in measuring the quantity of urine passed in a given time, and was suggested to the speaker by a patient who had charted the results on his own account to give him an idea as to the condition of his stricture which required periodical dilatation. The author made a large number of observations on the method, and found that it was reliable, and gave uniform results even in the hands of patients. He found that the number of drachms in five seconds varies with the total quantity passed in twenty-four hours, and inversely with the quantity of residual urine. Incidentally he noticed that dilatation with a large size of bougie, say No. 16 English, gave less satisfactory and less lasting results than dilatation with a more moderate size, *e.g.*, No. 9 or No. 12.

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EDITORIAL.

The Children's Bill.

It is refreshing to take up one's morning paper and discover amidst the mass of controversial Bills submitted to Parliament, a measure which cannot but appeal to the sympathies of members of every shade of opinion, as well as of every person who has at heart the welfare of the youth of the country. The legislation which is proposed, and which was introduced to the House of Commons by Mr. Herbert Samuel, is of a comprehensive character, and while it is mainly intended to consolidate and amend the law relating to the protection of children, various new measures are proposed of an important nature.

Shortly stated, it is meant to stop smoking by children under 16; imprisonment of child offenders; cruelty to children; overlaying, and deaths from unguarded fires. With regard to juvenile smoking, it will, we believe, be generally admitted that the interference of the State in this matter comes none too soon. During recent years the prevalence of cigarette smoking amongst young boys, and even girls, must have been apparent to the most casual observer of life, not only in the larger towns, but also in the villages throughout the country. The feeling of consternation and amazement aroused at first by the audacity of the diminutive street arab soliciting the reversion of your cigarette, or greedily dogging your footsteps on the chance of securing a "fag," has passed off. We have come almost to look with equanimity upon children who have scarcely commenced school-life, openly smoking in the public streets, cigarettes which have been as openly purchased in packets of ten for a penny. *O tempora! O mores!* What a change since the time when we ourselves, almost attaining man's estate, had to exercise Machiavellian devices in order to enjoy the fragrant weed on occasions few and far between. It may well be asked, of what use is all the talk about physical degeneracy, so long as such an obviously deteriorating influence is openly at work? We are glad therefore to note that Clause 37 of the Bill proposes: "If any person sells or gives to a person apparently under the age of 16 years, any cigarettes or cigarette papers, whether for his own use or not . . . he shall be liable, on summary conviction, in the case of a first offence, to a fine not exceeding two pounds; and in the case of a second offence, to a fine not exceeding five pounds; and in the case of a third or subsequent offence, to a fine not exceeding twenty pounds." In addition, constables have power to seize tobacco found on a person under 16, while any such young person found smoking or purchasing tobacco is to be reprimanded for a first offence and fined for subsequent convictions.

Deaths from burning and overlaying.—There are two causes of death amongst young children to which almost every day attention is directed, either by public inquiry or through the press. We refer to those sad and frequent cases of little children being left alone in the house and their clothes catching fire either from the overturning of a lamp or from an unguarded fire; and, secondly, to the appalling mortality as a result of infants being overlain.

In regard to both of these causes of death, it has been felt that the absence of legislative preventive measures has been largely responsible for the high mortality, inasmuch as a large proportion of the cases have been the result of culpable negligence, or at any rate of gross carelessness, on the part of those in charge of the children.

With reference to overlaying, there is abundant evidence in support of the contention that it is largely preventable and due to what we must regard as criminal carelessness. There is the fact of the frequency of overlaying amongst persons whose lives afford other indications of neglect of their children and of drinking habits; the large proportion of cases which occur on Saturday nights, and lastly the striking evidence afforded by a comparison with German statistics. In that country there are strict legal enactments whereby a mother not adopting the precautions which common sense should dictate in regard to her infant, may be charged with causing its death by such omission. The Bill we are considering deals with both problems in a manner which will be hailed with general satisfaction. Any person over 16 years of age having charge of child under 7 years of age who allows it to be in a room with an open, insufficiently protected fire-grate, and without taking reasonable precautions, is liable to a fine of ten pounds if the child suffers serious injury. While as regards overlaying, any person causing the death of a child under 3 years of age in this way is rendered liable to a fine of ten pounds, or twenty-five pounds if there is evidence that such person was under the influence of drink, and alternatively to imprisonment for a term not exceeding three months. While we fully sympathise with this latter clause, and believe that it would be administered with justice, yet it is only right to draw attention to a difficulty which may seriously detract from its usefulness. This consists in the medical proof of death from overlaying. In the great majority of charges against parents under this clause the sole evidence to support it will be of a medical nature, since the parents will tell the usual story in such cases; either frankly admitting that the child was found dead in bed, but stating that it had shown symptoms of illness the previous evening; or they will aver that it had convulsions, etc., and died while being carefully tended in the mother's arms. Unfortunately there is no absolute diagnostic sign of death from overlaying. In rare instances there may be present, externally, marks of pressure on the face, which certainly is strong corroborative evidence, but apart from this, and so far as internal appearances are concerned, there is nothing pathognomonic, and we simply find the signs characteristic of death from asphyxia, more or less well marked, and which may have resulted from numerous conditions other than overlaying. There is, we believe, a tendency to place too great weight upon the post-mortem appearances in substantiating charges of overlaying. They can never be conclusive, and at the most can only be held as supporting a charge of this nature, more or less strongly, in the absence of all other evidence of pathological changes to which death may have been due. But it is exactly in excluding other causes of death that one of the chief difficulties arise, because a little pulmonary congestion, a slight exacerbation of an existing bronchitis, a gastro-enteritis which has given rise to practically no characteristic symptoms, and leaves no traces of its existence, except a few easily overlooked patches of hyperæmic mucous membrane,—these and other conditions, it has been fully proved, often give rise to sudden and unexpected death in infancy. It is well to remember also, that in maternity and other institutions, where young children are kept under the most favourable conditions and in separate cots, and where overlaying is therefore out of the question, sudden deaths occur, and post-mortem examination often fails to disclose the cause of death.

Notwithstanding this difficulty, which may to some extent limit the usefulness of the clause dealing with overlaying, we regard it as one of great importance and value. The portions of the Bill dealing with cruelty to children, and more especially those consolidating the Infant Life Protection Act, deserve the support of all classes; and in connection with the latter Act we trust that the law will be made to apply to cases where only one infant is received for reward. We could adduce many instances where the existing restriction to two or more infants so received has resulted in gross abuses and culpable neglect.

An American Criticism of British Hospitals and British Surgeons.

AN article entitled "Present-day Surgery in England and Scotland" has recently appeared in our contemporary, *The Journal of the Minnesota State Medical Association.* Compiled as it is from notes made on a recent visit to this country by the elder Mayo of

Rochester, it conveys the impressions of a great surgeon and a keen but by no means unfriendly critic. While it is admitted that France and Germany offer great attractions to the American student who is a good linguist, "a short visit to the British Isles readily demonstrates that the former do not contain all that is worth seeing in surgery." He remarks on the fate of the prophet Lister, who was appreciated in Germany, and became established there, years before his theories were properly understood in the land of his birth; but he grants that to-day "antiseptic and aseptic methods are the rule in Great Britain, and are observed in the breach not more often than occurs at home or in continental Europe; practically all the more advanced surgeons in Britain operate in the most modern fashion, and conduct their operating theatres in every respect as they are conducted in America."

The opinion that London does not represent British surgery in the way that Paris represents the surgery of France is asserted by our critic, who goes on to say that some of the most modern surgery is to be seen in the provincial towns. He also draws attention to the anomaly that it is nearly impossible for a man who has made a reputation in the provinces, no matter how great his ability, to obtain a position on the staff of any of the London hospitals.

Regarding the administration and finances of the hospitals in this country, it is pointed out that in many instances charity is diverted from its proper channels to the giving of free service to people who can afford to pay, thereby doing great injustice to the doctors who practise in the district concerned. Moreover, no provision is made for the honest man of moderate means, "who must either swallow his pride and accept misplaced charity, or take refuge in a nursing home where the charges are high and the service exceedingly poor. The common people, who have made England what she is to-day, do not receive the care and attention which is given to the tramp and the bar-room loafer."

It must be confessed that as a nation we are far behind in providing for "the honest man in moderate circumstances." It is surely reasonable that he should be able to command the best doctoring and nursing in an efficiently equipped hospital for a sum which would be in keeping with an income of, say, from two to five hundred pounds per annum. In Germany this is provided for by one or more pavilions of the public hospital being sacrificed for paying patients; and in America a similar system prevails, or there are private hospitals possessing from one to three hundred beds, in which people of moderate means are received at correspondingly moderate charges. It is true that an attempt is made to provide for this class of patients on a small scale in this country, as, for example, at St. Thomas's Hospital in London and the Chalmers Hospital in Edinburgh; but the meagreness of the accommodation compared to the number to be provided for is sufficient to show how little attention and real interest has been bestowed on this question. That we are hampered by tradition, and that it is difficult for us to launch out into modern developments, may be freely admitted, but surely a nation which established the nursing of the sick on a proper basis, which showed through Lister how septic diseases might be banished from our surgical wards, which has from the outset led the van in sanitary science, and whose statute book contains innumerable Acts having for their object the amelioration of the conditions of life of the working classes, might devise and carry out a comprehensive scheme for the proper care of people of moderate means when they become the victims of injury or of disease.

Hermann Snellen.

IT is often surprising and not a little disappointing to find that an oculist, who may have achieved distinction by good scientific work, is on the other hand possessed of few of the practical qualifications of a surgeon. We have known not a few who have been, to say the least, clumsy operators and uncritical and impractical as regards treatment generally. Practical and scientific qualifications are not always associated in the same individual, as they are and must be in those whose life-work is to be of the greatest use to humanity.

If one were asked for one of the best examples of the scientific and practical ophthalmic surgeon, I think those who knew him, and there are many in all parts of the world, would point to Hermann Snellen. Trained under Mulder and Donders, Snellen had the best opportunities of laying a sound scientific foundation for the more practical work which he was afterwards to do with characteristic straightforwardness and energy.

The well-known test types for determining acuteness of vision which go by the name of "Snellen's types" were the outcome of a consistent application of a scientific principle suited to the requirements of practice. They have often been imitated but never superseded, and are in constant use all the world over. Other less widely known investigations, made either by Snellen himself or by others whom he inspired and encouraged, bear testimony to the interest which he constantly took in the science of ophthalmology.

With a natural aptitude for the more distinctively practical side of his specialty, it was perhaps fortunate that his long association with Donders should have been such as to have afforded him the exceptional opportunities which it did. With Donders he worked first as a student, then as assistant, and afterwards as colleague in the famous Gasthuis at Utrecht, in the direction of which he finally became Donders' successor.

Donders was primarily a physiologist, and had no time for operating. He found it to the advantage of his patients to let Snellen operate on them both in hospital and in private. Because he had the interest of his patients at heart, Donders acted in this way, while Snellen, actuated by the same motives, adopted an opposite course. He rarely entrusted an operation to any one else, because he felt confident that the patient would not be the loser if he attended to him himself.

As an operator, Snellen was resourceful in the highest degree. He was distinguished perhaps less by any particular brilliancy of technique than by the most thorough, painstaking attention to the smallest detail. For instance, he was most careful as to the way in which the light fell on the eye to be operated on, and as to the means of securing steadiness of the patient and of engaging his confidence and co-operation. To him the ophthalmic surgeon is indebted for not a few useful operations and modifications in the methods of operating.

Of recent years, probably no one attracted so many oculists from all parts of Europe and America as did Snellen to the Gasthuis at Utrecht, and to all he and Mrs. Snellen extended a most generous hospitality. There are many in this country who by his death have lost not only a highly valued teacher but a most esteemed friend.

The New Head of Morningside Asylum.

The Directors of the Royal Edinburgh Asylum can have had no easy task in the selection of a successor to Dr. Clouston. We understand that there were comparatively few applicants, considering the importance of the post, and the many advantages, professional, academic, and social, which it carries with it. The candidates were, however, all men of great experience and worthy of the honour to which they aspired. Many thought that success would have fallen to Dr. Lewis Bruce of Murthly, one of the most brilliant of the younger alienists of the present day. The choice of the Directors, however, fell upon Dr. George M. Robertson, Superintendent of the Stirling District Asylum at Larbert, whom we heartily congratulate, and at the same time we venture to express the opinion that his appointment will not only give general satisfaction, but that the traditions and remarkable success which has attended Dr. Clouston's régime at Morningside will be continued. Dr. Robertson has proved himself to be a successful administrator, and to him, if we are not mistaken, is due the credit of being the first to advocate and employ female attendants in the supervision of male patients, an innovation which we understand has been instituted with the best results. Dr. Robertson has also made his mark as a teacher, and in this respect the University is especially fortunate. We wish the new Superintendent the health and strength to carry out the work which lies before him, and which, we do not doubt, his abilities will cause to redound to his own credit as well as to that of the Institution of which he is now the head.

ORIGINAL COMMUNICATIONS.

REMARKS ON EMPYEMA, BASED ON A SERIES OF ONE HUNDRED CONSECUTIVE CASES.[1]

By Albert E. Morison, M.B., F.R.C.S.Ed., *Hon. Surgeon, Hartlepools Hospital.*

In considering empyema there are one or two points to which I should like to draw your attention.

I. The Physics of Effusion into the Pleural Cavity.—In the normal condition of the pleura the intrapleural pressure is negative, but becomes positive in purulent effusions. Effusion into the pleural cavity *first shows itself* as an area of dulness—(*a*) Just below the angle of the scapula. (*b*) In the axilla between the fifth and eight ribs. (*c*) In obliteration of Traube's semilunar tympanitic space. (*d*) In the right front near the angle made by the cardiac and hepatic lines of dulness.

Disappearing effusion is last manifest in the axillary line between the fifth and eighth ribs.

The root of the lung is its fixed point, and with increasing effusion the lung becomes compressed round it. The re-expanding lung last touches the chest wall at a point diagonally furthest from its fixed point, *i.e.* in the axilla about the fifth interspace. This is important to bear in mind, as it is the point of election, in cases of general purulent effusion, for incision and drainage. It also explains why emptying of the pleural cavity in "empyema necessitatis" occurs generally about the fifth interspace.

The lung does not tend to collapse on its fixed point when air is admitted into the pleural cavity. The intrapulmonary pressure is quite sufficient to maintain the two layers of pleura in contact except for a small area round the point of entrance of the air.

II. Interlobar Fissures.—The fissures dividing the lungs into lobes can be mapped out as follows:—A line drawn from the spine of the second dorsal vertebra downwards and forwards to the junction of the sixth costal cartilage with the rib divides the lower lobe from the upper; all above and in front of this line is upper lobe, all below and behind this line is lower lobe. On the right side a second fissure extends from the middle of this line just named to the junction of the fourth costal cartilage with the sternum. These fissures or sulci vary in depth, that between the upper and the lower lobes being deeper, and extend almost to the root of the lung. Pus forming in this fissure is very apt to escape detection, being transverse to the axis of the body, and very commonly is the form of empyema which empties itself through a bronchus.

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[1] Read before the Edinburgh Medico-Chirurgical Society, February 5, 1908.

III. Causes of Empyema. — 1. *Pleuro-pneumonia*, as Dr. Drummond of Newcastle first pointed out, is by far the most frequent cause of empyema. In 91 per cent. of my cases the history left no doubt of the truth of this important observation. The rich network of lymphatics immediately under the pulmonary pleura, the invariable association of pleurisy with pneumonia, the constant presence of the pneumococcus in pneumonic lungs, and a recognition of the fact that the pneumococcus is capable of causing suppuration, prepare one to receive an explanation supported by experience and the teachings of anatomy and physiology.

2. *Pleuritis.*—This is by no means so common a cause of empyema as is generally supposed. Only 4 per cent. of my cases appeared to be probably due to this cause. The number of ordinary cases of pleuritic effusion seen which never suppurate is remarkable if this be a frequent result. If an ordinary serous effusion becomes purulent, a dirty needle or aspirator is the cause in the majority of cases—some would say always.

3. *Tuberculous disease of the lungs*, with signs of cavity, occasioned empyema in two of my cases (2 per cent.). The purulent pleurisy followed a pneumothorax, as is the usual course in tuberculous cases.

4. *Tuberculous disease of the lower lobe of one lung, without signs of cavity*, was followed by empyema in one patient.

Case 1.—G. B., æt. 43, has had a cavity at his left apex for some years. Seven weeks ago he had an attack of acute pneumonia at his left base. His present complaints are a cough with profuse expectoration, shortness of breath, and loss of flesh. From being a stout man he has been reduced to a very thin one. The cough, he says, comes on at intervals, and at these times a large quantity of yellow expectoration is expelled by it. Relief is obtained for a time; then the cough and expectoration are repeated. Physical examination shows an apical cavity apparently about 4 in. in length. Posteriorly and laterally the left base up to the lower angle of the scapula is dull on percussion, the vocal fremitus is unaltered, and crepitation and increased vocal resonance are heard over the dull area. An aspirator needle introduced between the sixth and seventh ribs posteriorly, proved the presence of pus. The chest was incised at this spot, and 9 oz. of pus escaped. The immediate result was most satisfactory, all his symptoms being relieved. The tube was removed in three months, and the sinus closed, but crepitation continued still at the left base.

5. *Septic disease of abdominal organs* may produce empyema, directly, by direct continuity of tissue or by means of the diaphragmatic or retroperitoneal lymphatics; or, indirectly, by setting up a septic pneumonia. It is not an infrequent complication in abscess of the liver, appendicitis, perforating gastric or duodenal ulcer, acute pancreatitis, etc. Such a case was the following:—

Case 2.—A. M'G., æt. 36, was seen with Dr. Boswell on 16th January at 11 a.m., complaining of severe pain in the epigastric region of twenty-seven hours' duration. He gave the following history:—On the previous morning at about 8.30, while walking along the street, he was seized with violent pain in the pit of the stomach. He vomited immediately, but this gave him no relief. With difficulty he was able to return home a distance of about 300 yards, and at once went to bed. Dr. Boswell saw him twenty-four hours later, and, recognising the serious nature of the illness, asked me to see him. He gave a past history of having had some slight indigestion during the previous three weeks and of feeling depressed and tired, but beyond this he ailed nothing.

On examination, we found him looking ill, with an anxious expression; temperature, 100°; pulse, 92; respirations, 32. Breathing was almost entirely thoracic, the abdominal muscles were rigid in the epigastric region, and there was great localised tenderness on pressure under the right rectus muscle. Vomiting occurred as soon as anything was taken.

The diagnosis we made was a slight leakage from a duodenal ulcer, but, taking into consideration the length of time that had already elapsed, we administered a $\frac{1}{4}$ gr. of morphia hypodermically, and decided to open the abdomen in two hours if there were no improvement in his condition. On visiting him at 2 p.m. he was very much better, had not vomited, had slept most of the time, the acute pain had disappeared, and there was only some tenderness on deep pressure in the right hypochondrium. He was ordered nutrient enemata, and forbidden to take anything by the mouth. He progressed satisfactorily, except that his temperature remained raised from 99° to 102°, until the 21st, when he began to be troubled with pain in the right side of the chest and a short dry cough. On examining his chest, we found friction at the base of the right lung posteriorly, and dulness merging into the liver region was elicited on percussion. As the dulness extended, the breath sounds at the base of the lung became diminished, and on the 24th an exploring needle inserted into the pleural cavity through the eighth interspace posteriorly, drew off some stinking seropurulent fluid which had a strong acid reaction. On the 25th I opened the right pleura in the eighth interspace posteriorly, when about a pint of fluid, similar to that withdrawn by the exploring needle on the previous day, was evacuated. His temperature at once fell, and remained below 100° except on 1st February, when it rose to 101°. This was found to be due to blocking of the drainage tube by a large slough. On removing this his temperature fell to normal. The tube was removed on the 12th, and after this date the patient convalesced rapidly, and was able to leave home on the 24th with the wound healed.

6. *Staphylococcic or streptococcic infection of the lung, etc.*—One such case has come under my notice due to an osteo-myelitis of the ribs.

Case 3.—B. B., æt. 17, consulted me on 16th August 1905. Her mother noticed that for about six weeks she had been very short of breath, was very easily tired, and had become very much thinner. On examination, I found her temperature 101°, pulse 116, and feeble; she had an ashen complexion, and looked very ill. On inspection of the chest, the heart was seen beating under the right breast, movement on the left side was practically nil, and there was a general fulness between the ribs. On percussion, the whole of the left chest was absolutely dull; breath sounds were entirely absent, and the heart sounds were most distinct on the right side. On introducing an exploring needle into the left chest, thick pus was withdrawn.

August 18.—*Operation.*—The left pleural cavity was opened in the fifth interspace in the mid-axillary line, and about 3 pints of thick pus escaped. A large drainage tube was inserted. After this she rapidly improved, the discharge, at first very profuse, gradually diminished, but a large cavity remained in the pleura. On 9th November chloroform was administered, and a thorough examination made. The whole of the fifth rib was found to be necrosed and removed. On 2nd December the wound was again examined under chloroform. The lung was still unexpanded, and the sixth rib was felt to be bare and removed. A counter-opening was also made in the seventh interspace posteriorly, and a second drainage tube inserted. Considerable improvement took place in the patient's condition after this until 17th December, when she began to complain of pain and stiffness in the back of the neck. This gradually became worse, her temperature ran up to 104°, sickness set in, and she became comatose, and died on the 20th of cerebro-spinal meningitis. Unfortunately no post-mortem could be obtained.

DIAGNOSIS.—In the ordinary case, the patient is being attended for pneumonia, and presents the usual symptoms and signs of that disease. The acute illness runs its course, and convalescence seems assured. Then it is noticed that the patient does not recover as was expected. He becomes listless, has a poor and fitful appetite, loses flesh, and sweats at night. Vomiting is a not infrequent symptom, and has appeared to me more common when the right side is affected. There is a short, dry, troublesome cough, and a febrile temperature. A peculiar ashiness of complexion may be observed. With symptoms of this kind, a history such as has been described, and physical signs of fluid in the pleura or of consolidated lung, the exploring needle should find pus.

In several cases I have seen the diagnosis has been difficult from the misleading character of the history and symptoms, and has only been arrived at by a complete examination and confidence in physical signs. The difficulty arises from the curious simulation of an abdominal ailment by certain of these cases. The patient, if a child, complains of pain in his "belly." The illness commences acutely with vomiting, distension, tenderness, and hardness of the abdomen. The cough is not an aggressive feature, and it is easy to regard the case as one of peritonitis, which it closely resembles. In some cases of simple pleurisy, the same abdominal tenderness, resistance, and pain are seen, and the explanation is obvious if the distribution of the intercostal nerves is remembered, the sixth terminating in the epigastric region, the tenth in the umbilical region. The pleuritic pain is referred to the end of the irritated nerves; the skin supplied by them is tender, and the abdominal muscles enervated by them are contracted. When, too, it is remembered that acute idiopathic peritonitis is one of the rarest of ailments, such a mistake is not likely to happen. The physical signs are those of fluid in the pleura, deficient expansion of the affected side of the chest, and approximation of the ribs, with diminution in size of the intercostal spaces, is the rule, and it is only in rapidly forming effusions that separation of the ribs with bulging of the intercostal spaces and œdema of the chest wall occurs.

Absolute dulness and resistance on percussion are present, it may be over practically the whole side or over a limited area and in any part of the lung.

Vocal fremitus is weak or absent, and its localisation is sometimes difficult to test accurately. The old-fashioned single stethoscope will be found valuable as an aid. By applying the ear-piece to the palm of the hand and the chest-piece to the suspected site, small localised areas of altered fremitus may be mapped out.

Vocal resonance is also of great assistance, and corresponds with the condition of the breath sounds. When the latter are absent, voice sounds are also absent; when the breathing is tubular, the vocal resonance, and especially a whisper, is intensified. In children who have thin chest walls it is specially unreliable. Bacelli's theory—that the whispered voice is conducted through serum but not through pus—has not in my experience proved of any value as an aid to diagnosis. The nature of the breath sounds depends on the sounds that are produced in the lungs or in the bronchi, and not upon the presence of fluid. Fluid transmits sound well, but there may be no breath sounds produced, and so none are audible through the fluid. Tubular or bronchial breathing is present in a fair proportion of cases, and, especially in children, owing to the greater resiliency of their chest wall, a correspondingly small degree of compression of the lung, and greater patency of the bronchi.

The heart is frequently altered in position and the heart sounds are absent from their normal position, or present in some other region such as the left axilla or to the right of the strenum. In some cases the side is hyper-resonant or the percussion note little altered, especially when the effusion is on the left side. In such a case the tympanitic area of resonance usually occupied by the stomach laterally will be dull, and the dulness extends over as far as the epigastric region. These signs are due to the diaphragm being pushed down by the fluid in the pleural cavity, and displacing downwards the abdominal contents. On the right side the dulness of fluid in the chest may be mistaken for the normal liver dulness, if the lower edge of the displaced liver is not recognised.

In all doubtful cases the exploring needle should be used. It may be employed with perfect safety, if the skin round and over the proposed puncture be previously purified and the needle rendered aseptic.

In some cases several punctures are necessary before the result is certain, and even though the needle goes into pus this may fail to be withdrawn. In every case where nothing comes through the needle, it should be suspected of being blocked. These difficulties arise in localised empyema, or where the pus is inspissated or flaky.

Prognosis.—1. That pus in the pleural cavity is capable of *absorption* has been demonstrated to me by one case which came under my notice:—A. S., æt. 3. The presence of pus was diagnosed by physical signs and verified by the needle, but the parents refused operation. Recovery followed without expectoration or external discharge of the pus. In another case, C. W., æt. 4, operative interference was refused for six weeks after the diagnosis of empyema was made by the needle, and on opening the chest only 4 oz. of thick sticky pus came away. It looked as if the pus were in process of absorption.

2. *Spontaneous evacuation through a bronchus.*—In two cases recovery followed this event without operation. C. W., æt. 6, had a large empyema on the right side. Operation was refused. The pus ruptured into a bronchus, was expectorated freely, and recovery took place in twenty-one days. R. U., æt. 46, had pneumonia of the middle lobe of the right lung on 3rd August 1905. Interlobar empyema discovered by physical signs, and exploring needle on 26th August. Operation refused. Pus was evacuated by expectoration until 24th September. Complete recovery.

In ten cases pus in such large quantity as to make it certain that an opening had formed in the lung, was expectorated prior to operation. After operation these cases pursued an aseptic course, and complete recovery without damage to the lung followed in all. Most of them came to me with a diagnosis of consumption.

3. In some cases *pus* is discharged into the *œsophagus, stomach*, or other adjacent organs. This can only take place where the accumulation is great and the course of the disease is prolonged and unaided. I have no experience bearing on it.

4. *Spontaneous evacuation through the chest wall*, the so-called "empyema necessitatis," is of all forms of spontaneous evacuation the most unsatisfactory. It usually occurs through or above the fifth interspace, and œdema of the chest wall is a common signal. In a few cases recovery follows, but the majority die of exhausion or waxy disease. Five cases of this have occurred in my hundred

cases. All had been discharging a considerable time before coming to me. In two cases the pus had escaped through the eighth interspace in the mid-axillary line. The other three cases were discharging, one through the second interspace below the centre of the clavicle, the other two through the fifth interspace. Four of these cases were cured by Estlander's operation, the fifth by ordinary incision and drainage. The last case, E. E., æt. 26, had been under treatment for some months prior to consulting me, and had undergone two operations for necrosis of the ribs. On examination, a tortuous sinus existed under the right breast, and this led through the sixth interspace into the pleural cavity. A counter-opening was made in the mid-axillary line in the fifth interspace, and a large-sized drain inserted. The breast was reflected upwards by a semilunar incision, the sinus opened up and scraped, and plugged with iodoform gauze extending up to but not through the opening in the chest wall. A tedious recovery took place, but no deformity of the chest resulted. This successful result I attribute to the valvular nature of the opening through which the pus was discharged, preventing septic infection of the pus which was in the pleural cavity.

5. *Surgical treatment* offers the best results, immediate and remote.

My cases prove that uncomplicated empyema treated with proper surgical care is not a serious disease, for of a hundred cases all but three recovered. The deaths were due to bronchitis, marasmus, and cerebro-spinal meningitis respectively.

If the saving of life is satisfactory, the perfect recovery of these cases is more satisfactory still. I have measured and examined the chests of most of them months after operation, and, except for the scar, it is impossible to say which side has been affected.

Empyema has never to my knowledge been followed by tuberculous lung disease. Recovery has been complete and permanent in all uncomplicated cases. In one of my cases, a boy æt. 9, the right lung was compressed for six months before an operation was allowed by the parents, and a marked lateral curvature was present. Two months after the closure of the wound the right half of the chest measured the same in circumference as the left, and all trace of spinal curvature had disappeared. Such a result can surely only be predicted if the irritation of putrefaction or irrigation be avoided; either causes chronic thickening, induration, and subsequent contraction of the inflamed pleura, with deformity of the chest and spine.

The average duration of treatment from the date of the incision to the completion of healing was thirty-three days. The shortest period was twenty-one days, the longest sixty-one days.

Treatment.—There is no medicinal treatment that will cure empyema. It requires surgical measures as an ordinary abscess does. Occasional recoveries follow *aspiration*, and in my earlier cases I tried it, but very seldom with good result. In a large percentage of cases the pus reaccumulates rapidly, and I soon concluded against further trial of the aspirator.

Aspiration is, however, of service in one class of case—in patients who are suffering from dyspnœa, due to a large collection of pus, or in whom some complication, such as double empyema or severe bronchitis, renders operative interference inadvisable. In such cases it is to be resorted to only to tide the patient over a trying time, and as soon as the urgent symptoms disappear the chest should be opened and drained. In the following case I employed this method with satisfactory result:—

Case 4.—G. C., æt. 10 months. First seen 14th November. A history of "bronchitis" for a fortnight. Left chest full of fluid, which the needle proved to be pus. There was capillary bronchitis on the right side, with great dyspnœa. I aspirated and withdrew a pint of pus from the left chest, with marked improvement to the respiration. The child's condition improved, and on 20th November I opened and drained the left pleura of 1 pint of pus. Convalescence was rapid.

The Operation.—The patient, surgeon, instruments, and assistants are prepared as for an aseptic operation with the most scrupulous care. An anæsthetic in the case of children is always advisable, though in the case of adults with a very full chest, the operation can be done, and with much greater safety, with the aid of a local anæsthetic.

Chloroform is the best anæsthetic for the purpose, but must be administered with special care, and *during the whole of the operation the patient should lie on the back.* I have seen most serious effects produced by turning the patient over on to the sound side during the operation. This may be avoided by drawing the patient to the edge of the table, so that the side to be incised projects over the edge.

The situation of the incision.—In all cases it is advisable before incising the chest wall to explore with a needle to ascertain the position of the pus. This was very forcibly impressed on me by the following case:—

' Case 5.—E. W., æt. 3, had broncho-pneumonia three weeks ago, and as the child's health and the condition of the chest did not improve, its medical attendant explored the left chest with an exploring needle, and found pus in the fifth interspace in the posterior axillary line. Two days after, he asked me to operate. Unfortunately, the exploring needle had been forgotten, and I therefore made the central point of the incision at the spot indicated by the previous needle puncture. On opening the pleural cavity, no pus was found, and though I searched in all directions with a pair of sinus forceps the abscess could not be detected. The incision was therefore closed, and next day with an exploring needle I found, after many attempts, a small collection of pus (about 2 oz.) in the fifth interspace about 2 in. from the spine. A drainage tube was inserted, and the case did well.

The point I select when possible is in the sixth interspace just in front of the posterior axillary line. A vertical incision is first made through the skin, then a horizontal one through the muscles along the upper border of the seventh rib, into the pleural cavity. A pair of sinus forceps is then introduced into the pleural cavity, by opening and withdrawing which the wound is dilated. Before all the pus has escaped an indiarubber drainage tube, a $\frac{1}{4}$ in. in diameter and 2 in. long, is inserted. The tube is perforated for the inner third of its length only, for if there are any openings in the outer part of the tube it frequently becomes blocked from granulations growing into them. A safety-pin passed through the outer end prevents the drainage tube from slipping in—an accident apparently of not infrequent occurrence. As soon as the discharge has become small in quantity, half the tube may be cut off, the remainder retained for a few days. For the first days after removing the tube I am always anxious, and if the cough returns, with some rise of temperature or vomiting, I explore the wound with a probe, lest the outer opening should have closed too quickly.

In long-standing empyema, the diaphragm may be wounded in re-introducing the tube, if care is not taken. The collapsed lung allows the diaphragm to ascend into the chest, and it lies closely apposed to the chest wall; being softened, too, it is easily torn and the abdominal cavity may be opened.

The wound is dressed with corrosive gauze and wood-wool wadding, and the dressing is kept in place by a domette bandage fixed by braces over the shoulders, and prevented from rising to let air pass underneath by three or four turns of elastic webbing bandage. It is in all cases advisable to dress the wound two or three times during the first twenty-four hours, in which the discharge is most profuse. The dressings after this are changed daily till the second week, when every other day is generally sufficient. The guide to frequency of dressing is the amount of discharge. The bandage should never be allowed to be stained longer than can be avoided. During the third week, in a large proportion of cases, the tube can be removed and the wound rapidly closes. The discharge should be serous after the third or fourth day. If it is purulent, this indicates either that the tube is not acting efficiently or that the wound has become septic. Irrigation is unnecessary and hurtful. Even the most fœtid cases become sweet after a few days' good drainage and careful dressing. As an aid to assisting the lung to expand, immediately the patient is out of bed, he should be encouraged in the use of gymnastic appliances—trapeze, horizontal bar, etc., and in making respiratory efforts such as are required in running upstairs, or in playing wind instruments. In a certain proportion of cases, a long narrow sinus which discharges a small quantity of serum, persists in spite of this treatment. The line the sinus takes is generally backwards and upwards. I have found that by making a counter-opening posteriorly midway between the end of the sinus and the original opening, inserting a drainage tube and allowing the first wound to close, that the closure of the sinus is speedily effected.

In four cases I have performed Estlander's operation, and the notes sufficiently indicate the class of cases in which this operation is called for. In all instances the wound had been allowed to become septic. In all there was persistent purulent discharge for from two and a half to eight months, and this had reduced the patients to a weak and emaciated condition. The side was contracted, the ribs close together, and the lung appeared bound down.

A semilunar incision with its convexity downwards was made in the lateral chest wall, and the soft parts dissected off the ribs and turned upwards. An incision was next made through the periosteum covering the ribs from the third to the eighth, and a varying amount of bone excised, from 2 to 4 in. A free opening was then made through the pleura, and a counter-opening posteriorly. A drainage tube was passed from one opening to the other, and in shortening it the tube was left in the posterior opening. All the cases did remarkably well, but in all considerable deformity remains. My conclusions are:—

That pleuro-pneumonia is the most frequent cause of empyema.

That empyema rarely follows pleurisy with effusion.

That in adults empyema is more likely than in children to be secondary to serious lung disease.

That the diagnosis of empyema is not always easy, for it may be ushered in by symptoms pointing more to the abdominal than the thoracic cavity, and the physical signs resemble closely those of consolidation.

That the exploring needle should be used in all doubtful cases, and, if needful, in more than one place.

That there is no danger in using the needle with proper care.

That the immediate prognosis of an uncomplicated empyema treated by incision and drainage is good. It is worst when allowed to burst through the chest wall.

That the remote prognosis is excellent. No deformity follows recovery, and no sequelæ are to be anticipated.

That the best prognosis can only be given in cases where an aseptic condition of the pleural cavity can be assured by antiseptic operation and antiseptic after-treatment.

That the anæsthetic should be carefully administered, and the patient not turned over during its administration.

That in adults it is safer to do the operation without general anæsthesia.

That aspiration is disappointing as a curative agent, but is useful in some cases temporarily.

That incision and drainage with antiseptic precautions may be trusted to cure all cases of curable empyema.

That irrigation is unnecessary and dangerous.

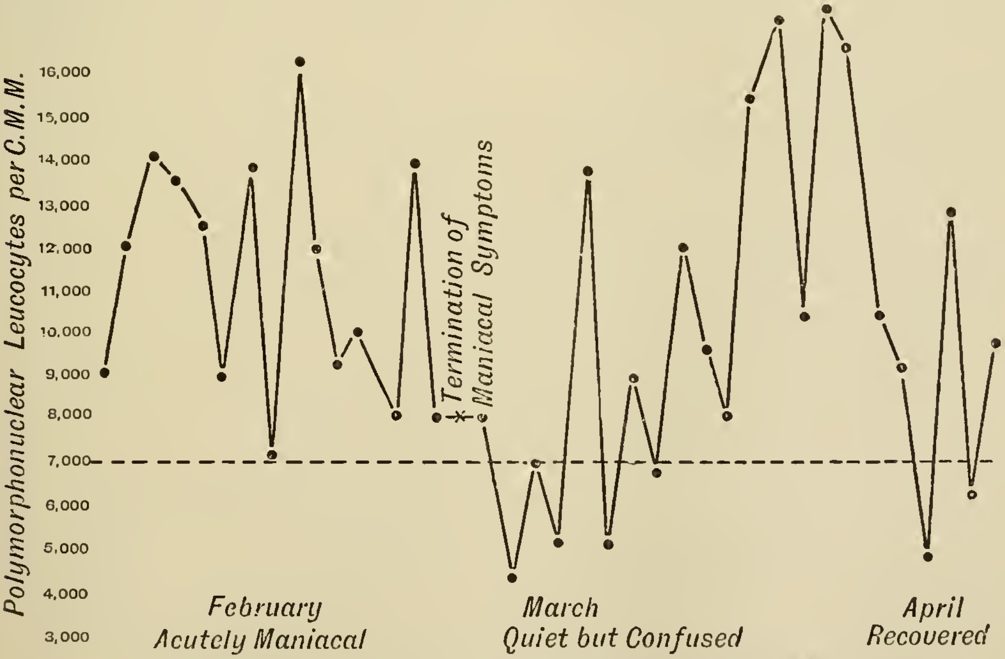
That rib resection is needful in some neglected cases, but in the generality of cases it is meddlesome surgery.

THE SYMPTOMS AND ETIOLOGY OF MANIA.

By Lewis C. Bruce, M.D., F.R.C.P.Ed., *Medical Superintendent, Perth District Asylum, Murthly.*

(*Continued from p.* 120.)

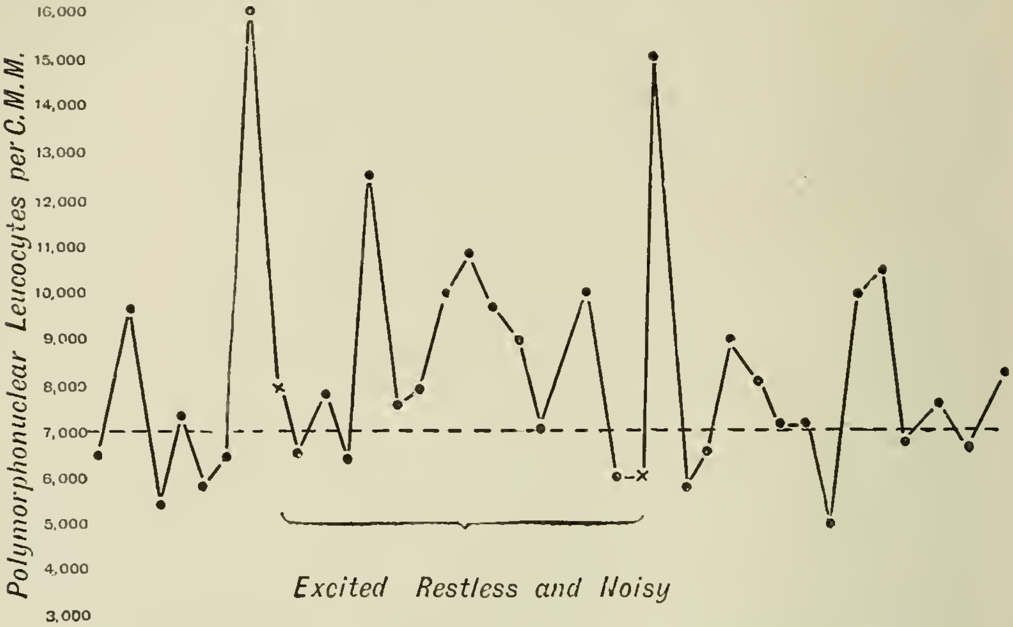
In cases of recent mania of the confusional type, the leucocytosis is always high, and the higher the leucocytosis the more hopeful is the prognosis. In a patient who suffers from a short sharp attack of mania and makes a rapid recovery, the polymorpho-nuclear leucocytosis is uniformly high, even after recovery is complete. And this hyper-leucocytosis persists apparently indefinitely. In one female adolescent patient whose blood I have had opportunities of examining at intervals during the last three years, during which she has enjoyed sound mental health, I have always found a polymorpho-nuclear hyper-leucocytosis present.



Polymorphonuclear Leucocyte Chart in a Case of Mania (Confusional Type)

Chart 3.

In cases of confusional mania who convalesce more slowly, the polymorpho-nuclear cells are at first greatly increased in number, then they subside somewhat, only to increase again as complete recovery takes place (Chart 3).



Polymorphonuclear Leucocyte Chart in a Case of Chronic Mania (Confusional Type)

This is a continuous daily record for thirty-six days.

CHART 4.

In patients who do not recover, one of two things happens. Either the patient suffers from chronic mania with recurrent exacerbations of excitement, or the patient becomes demented.

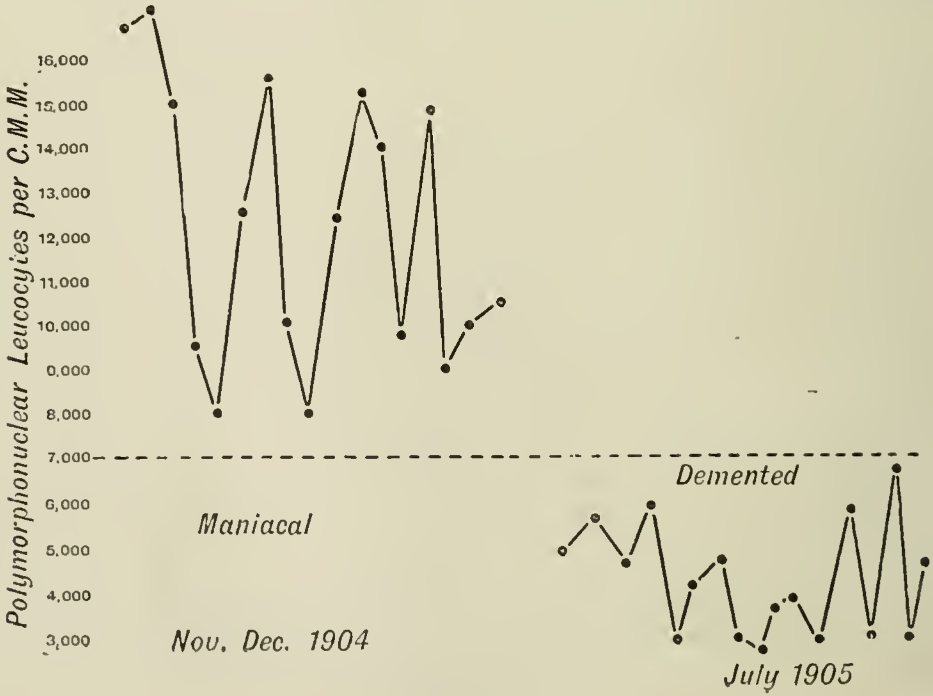
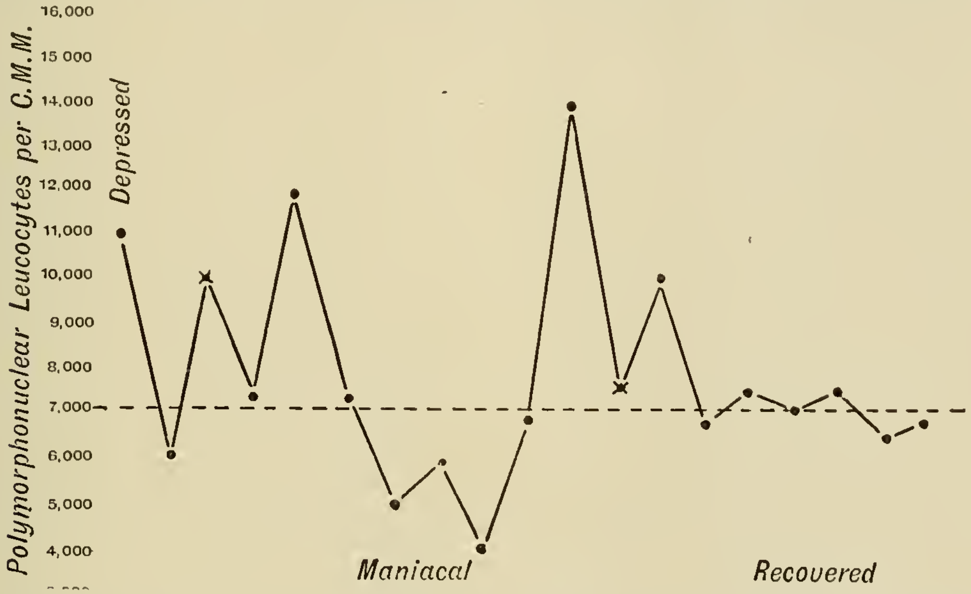


CHART 5.

If the disease takes the form of chronicity with recurrent exacerbations, the polymorpho-nuclear leucocytosis varies considerably, but presents distinct waves corresponding to the recurrent attacks of excitement (Chart 4). If the patient becomes demented, then the polymorpho-nuclear leucocytosis falls below the normal as if to indicate that the patient was exhausted and unable to cope further with the toxæmia (Chart 5). I have seen a few of such cases recover, however, if their leucocytosis was accidentally or artificially stimulated (Charts 6 and 7).

In cases of mania of the manic-depressive type, the symptom of hyper-leucocytosis is often present, and corresponds to the period of excitement; thereafter it falls to normal, and with the exception of an occasional rise remains at normal until another attack of excitement or an attack of depression sets in (Chart 8).



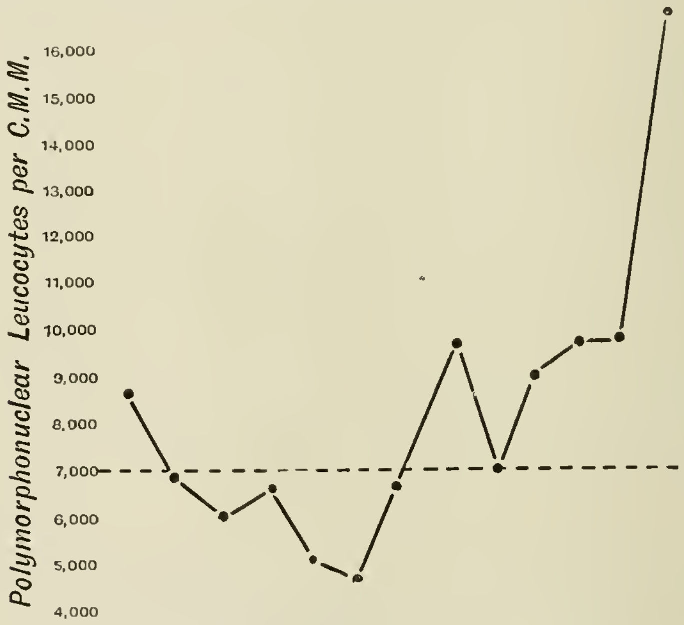
Polymorphonuclear Leucocyte Chart in a Case of Recurrent Mania (manic-depressive), showing the leucocytosis throughout the course of an attack

CHART 9.

In many of these cases of manic-depressive insanity, however, there is a regular sequence of events in the leucocyte curve which I am only able to show you in chart form in patients who suffered from short attacks. The period of excitement in many of these cases of manic-depressive insanity is so prolonged, lasting perhaps three and four months, that it is impossible to represent the leucocytosis in a lantern chart (Chart 9).

Chart 9.—The patient, a male, æt. 50, had suffered from short recurrent attacks of the manic-depressive insanity since adolescence. The attack, the leucocytosis of which is represented in the chart, commenced with depression, which lasted for a little more than a day, and the polymorpho-nuclear leucocytosis was 11,000 per c.mm. The following day it had fallen to 6000, and the patient complained of pains in the joints, which he ascribed to rheumatism. On the third day he was maniacal, and the polymorpho-nuclear leucocytosis had risen to 10,000 per c.mm. For the next nine days he was in a state of great elevation and excitement. It will be noticed that at the commencement and termination of the maniacal attack there were marked rises in the polymorpho-nuclear leucocytes, but that at the very height of the attack the polymorpho-nuclear leucocytes fall below 7000 per c.mm. Recovery followed the last rise, and the leucocytosis at once returned to about 7000 per c.mm. Subsequent attacks in this patient always presented the same sequence of symptoms and the same leucocyte curve, and similar records have been obtained in other cases where the attacks were so short as to facilitate continous examination.

As interesting comparisons I show you two charts of hyper-leucocytosis occurring in sane persons.



Polymorphonuclear Leucocyte Chart in a Case of Fissure of the Tongue

CHART 11.

Chart 10.—A. R. is a case of rheumatic arthritis. The leucocytosis is shown for a period of fourteen days, when the patient was suffering from a recurrent attack of pain in the joints, together with general malaise.

Chart 11.—K. D. is a member of the nursing staff who volunteered to act as a control to certain observations which we were making on the tuberculo-opsonic index. It was noticed that her polymorpho-nuclear leucocytosis became high, the pulse was a little fast, but otherwise the subject appeared to be in excellent health. There was no disturbance of temperature. Her serum strongly agglutinated the washed red blood corpuscles of a healthy person. It was only accidentally that we discovered that this control volunteer was suffering from a fissure of the tongue—a lesion only $\frac{1}{2}$ in. long and $\frac{1}{8}$ in. deep, and yet the resulting bacterial toxæmia as indicated by the leucocytosis is most marked.

In many cases the results obtained from leucocyte observations are of value in indicating the disease process when practically no diagnosis can be made from the mental symptoms alone.

Chart 12 shows the leucocytosis in a case of peculiar interest. The patient, a married woman, æt. 34, was admitted suffering from delusions of suspicion. She was thin and poorly nourished, and the husband stated that he had observed a gradual change coming over her. She became irritable, changed in character, and at times exhibited violent temper on little or no apparent provocation. Then she suffered from hallucinations of hearing, which led her to suspect the presence of other people in the house, and finally she became suspicious of her husband, believing that he was trying to poison her. On admission she simulated a case of delusional insanity. She was apparently quite clear and sensible, answered questions and expressed her delusions freely. On physical examination nothing could be detected beyond the fact that there was a hyper-leucocytosis, which is not as a rule a symptom of delusional insanity. Further questions elicited the fact that she had been delivered of a child some two years prior to admission, and that since then she had occasionally suffered from a vaginal discharge. Upon examination she was found to be suffering from a fissure of the cervix about $\frac{1}{2}$ in. deep and $\frac{3}{4}$ in. long. The discharge from the fissure when inoculated upon agar gave a rich growth of streptococci. Her blood serum strongly agglutinated a streptococcus obtained from a case of confusional mania. The local lesion was treated and healed in two months, and the patient made a perfect recovery. She remembered everything that had happened prior to and since her admission, but she stated that the period of her existence corresponding to her illness seemed to her to be like a dream. It was quite evident, therefore, that there had been a considerable amount of mental confusion, and I regard this case as one of confusional mania in whom the symptom of maniacal excitement had been suppressed.

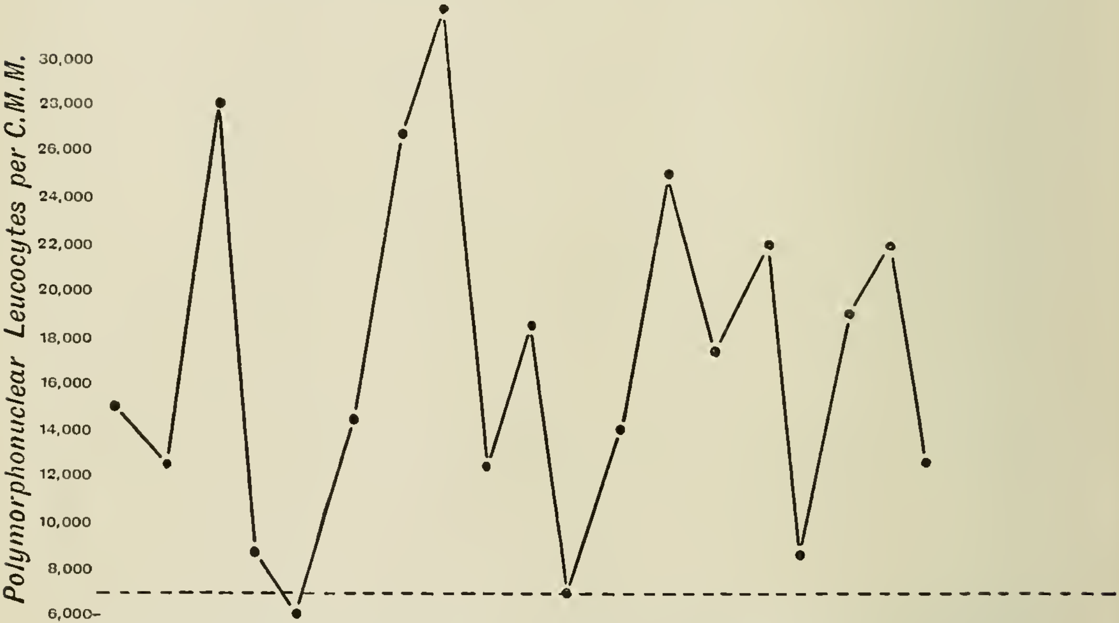
Chart 13 is a very similar case occurring in a married woman, æt. 50. For several years she had been irritable, delusional, and morbidly suspicious of her husband. She searched his clothes, read his letters, and had all his movements secretly watched, because upon one occasion she had discovered a hair upon his topcoat which was certainly not her own. She was sent to me as a case of chronic delusional insanity.

On admission, the only symptom which we could detect was a hyper-leucocytosis, and she looked thin, pinched, and badly nourished.

The nurse reported, however, that the patient had a vaginal discharge, and upon examination she was found to have an intra-uterine fibroid. The discharge from the uterus was swarming with organisms, chiefly streptococci. Her blood serum contained agglutinins to a streptococcus isolated from an undoubted case of confusional mania. In this case, as in the previous one, we demonstrated the presence of a bacterial toxæmia with the probable local lesion. The patient was removed by her friends.

Chart 14 throws some light upon the vexed question as to whether alcoholism is a cause or a symptom of insanity.

The patient, a male, æt. 34, was admitted suffering from hallucinations of sight and hearing and also delusions. His history was that for years he had been drinking heavily, was arrested by the police, found to be insane, and transferred from the prison to the asylum.



Polymorphonuclear Leucocytes in a Case of so-called Alcoholic Insanity

Chart 14.

On admission he appeared well nourished and healthy. He had undoubtedly vivid hallucinations of sight and hearing, and he was dangerously impulsive. Upon two occasions he made sudden unprovoked attacks upon the night attendants who were in charge of the dormitory in which he slept. Such attacks are very typical of alcoholism. He presented a very marked hyper-leucocytosis, but no temperature. From his urine my assistant, Dr. Howard, isolated a streptococcus which was agglutinated by the patient's serum in a dilution of 1 in 20 within an hour, while the sera of control persons gave no reaction. The bacterial examination of the fæces gave an almost pure growth of strepto-cocci, the *B. coli* being practically absent.

He recovered after a residence of four months, but during the whole period of his stay in the asylum he presented this symptom of hyper-leucocytosis.

Chart 15 shows the leucocytosis in a similar case occurring in a male æt. 20. The patient was of the degenerate type. He had been three times discharged from the army for drunkenness. He was admitted suffering from hallucinations of hearing and sight. Beyond general tremulousness of the muscular system, he presented no symptoms except a hyper-leucocytosis. His serum contained agglutinins to several strains of streptococci isolated from cases of undoubted confusional mania. During his residence in the asylum he suffered from several slight attacks of restlessness associated with a return of the hallucinations of hearing. He was eventually transferred to a neighbouring asylum.

Both these patients were undoubtedly cases of alcoholism, but the fact that they presented definite symptoms of bacterial toxæmia suggests that the alcoholism was a symptom rather than a cause of their mental state. Since these observations were made three additional cases of chronic alcoholism have been examined, and they all presented the same physical symptoms.

Chart 16 shows the leucocytosis in a female, æt. 26. The girl was sent to the asylum because she was unmanageable at home.

On admission, the patient showed the very common symptom in adolescent cases of arrested development, but no mental or physical symptoms of disease could be detected. Her blood was regularly examined, and very shortly after admission a hyper-leucocytosis was noted, together with a quick pulse of over 100 per minute. She became irritable and quarrelsome, sometimes refused food, and behaved like a petulant child. This condition lasted for about a week or ten days and then passed off, the leucocytosis falling to about 7000 per c.mm. and the pulse rate to between 60 and 70 per minute. Her serum showed agglutinins similar to the cases already cited. Several similar attacks have occurred with similar physical symptoms. If no observations had been made upon the leucocytosis and serum reaction, these periodic attacks would have been ascribed to fits of bad temper, whereas all the symptoms point to the patient as being a masked case of confusional mania.

The consistency of the results shown by these blood observations alone are in my opinion suggestive. They suggest bacterial invasion, and that the victims of confusional mania suffer from a chronic insidious toxæmia not only during the maniacal attack but for a subsequent indefinite period. The mania, in fact, may be only an accidental symptom of the disease; while the manic-depressive cases suffer from recurrent attacks of toxæmia. But whatever the significance of this symptom may be, these observations are facts not fiction, which future workers may relegate to their proper sphere when the great problem of the causation of mania is solved.

Doubts have been thrown upon the accuracy of these records, but I know of no observer who has conducted similar observations, dividing the various forms of mania from one another, or made continuous observations extending over weeks and months. There is also this additional fact, that six different workers in the Murthly Laboratory, several of whom were sceptical, have corroborated these results, and further, our collective observations upon the leucocytosis of healthy persons tally with those of accepted published records.

SUMMARY OF LECTURE II.—The blood serum in health contains protective agglutinins to certain strains of staphylococcal and streptococcal organisms. These protective agglutinins cannot be demonstrated in the blood serum of over 60 per cent. of maniacal patients.

In addition to these agglutinins, which we may call normal agglutinins, the blood serum may contain agglutinins directly the result of disease, an example of which is the typhoid agglutinin which appears in the blood serum as the result of an attack of typhoid fever. Such agglutinins are known as specific agglutinins because they act only upon the infecting organism.

In the blood serum of patients suffering from mania, specific agglutinins to certain organisms of the streptococcal group can be demonstrated to exist, and similar agglutinins are rarely present in the blood serum of apparently sane and healthy people. The streptococcal organism with which these observations were made were isolated from the blood, urine, and fæces of maniacal patients.

The leucocytosis, or the number of white blood corpuscles in the blood of maniacal patients, is greatly increased, and this increase is largely due to an actual and relative increase in the polymorpho-nuclear leucocytes. A hyper-leucocytosis of the polymorpho-nuclear leucocytes is generally regarded as an evidence of bacterial toxæmia.

Continuous blood observations in cases of confusional mania reveal the further fact that after recovery from the maniacal attack the patients present this symptom of hyper-leucocytosis, and it is reasonable to suppose that this evidence of toxæmia was also present before the maniacal attack. In other words, in the type of mania which I call confusional, the disease is a chronic, insidious toxæmia, of which the maniacal attack is only an incidental complication.

LECTURE III.

In the first lecture I dealt with the physical symptoms which occur in cases of mania. I drew attention to the commonly accepted belief that maniacal states are conditions of brain poisoning. It was shown that the blood serum in over 90 per cent. of maniacal patients contained an agglutinin which agglutinated the red blood corpuscles of healthy persons. This agglutinin can also be demonstrated in the serum of over 50 per cent. of persons who are sane and apparently healthy, and can be artificially produced in the lower animals by infecting them with coccal organisms. The presence of such an agglutinin in the blood serum was therefore taken to indicate some form of coccal invasion, but as the sane as well as the insane present this symptom, some further factor must assist in the production of maniacal states, and this further factor was stated to be an inherited or acquired instability of the nervous system which would render it peculiarly liable to disorder from states of toxæmia.

The evidences of general failure of nutrition, the disorders of the alimentary tract, and the character of the nitrogenous excretion by the urine, are all such as would lead one to expect that maniacal states are closely allied to the diseases known as infective.

In the second lecture I mentioned the fact that the blood serum of healthy persons contains protective agglutinins to certain strains of coccal organisms, and that these protective agglutinins cannot be demonstrated in the blood of over 60 per cent. of patients suffering from mania. In addition to these normal agglutinins, the serum of maniacal patients was shown to contain specific agglutinins to certain strains of streptococci isolated from the blood, urine, and fæces of such patients.

The hyper-leucocytosis found in patients suffering from mania was described, and it was pointed out that the increase of the polymorpho-nuclear leucocytes was strong evidence of bacterial toxæmia.

I divided cases of mania into two great classes—mania of the confusional type and mania of the folie circulaire type or manic-depressive insanity. In this lecture I merge all manias into one great group.

If, as indicated in my first two lectures, the diseases known as mania are due to bacterial toxæmias, then the natural question arises, what organism or class of organisms produce the toxæmia, and how do they attack the patient? To answer these questions it is necessary to describe in detail the various observations undertaken to discover the organism.

My first observations were conducted as follows. I argued that if the organism was circulating in the tissues it might be possible to obtain it in pure culture from a sterile necrotic area. I knew that the subcutaneous injection of certain irritants produced a hyper-leucocytosis which frequently improved the condition of the patient, and I combined this method of treatment with bacterial investigation. I injected therefore with aseptic precautions from 0·5 to 1 c.c. of terebine subcutaneously. In the course of a week an abscess formed and from 1 to 2 c.c. of the abscess contents were then withdrawn hypodermically with a needle attached to a syringe. The pus so obtained was mixed with nutrient broth and incubated at 37° C. for twenty-four hours. The whole operation was conducted painlessly with local anæsthesia. Out of fifteen such abscesses I isolated a short diplo-bacillus in seven cases. The remaining abscesses were sterile. I merely mention this work to dismiss it, because after working with this organism for some six months I came to the conclusion that it had nothing to do with the disease, and was possibly an accidental contamination.

I next directed my attention to the blood, and by means of a 10 c.c. glass syringe attached to a needle, 10 c.c. of blood was withdrawn from any prominent vein in the forearm and transferred to two flasks, each containing 250 c.c. of sterile bouillon. In some instances these flasks were immediately placed in the incubator at 37° C., in others twenty-four hours were allowed to elapse prior to incubation to allow the leucocytes to die and so inhibit their phagocytic action. The blood was examined in this manner in fifteen cases of mania, all acute recent cases. In twelve of the observations the flasks were sterile at the end of seventy-two hours, two were accidentally contaminated, and only one yielded a short streptococcus, which was eventually proved to be in some way connected with the disease process. As mentioned in the previous lecture, it was found that the blood serum of the patient from whom this organism was obtained agglutinated the organism in dilutions up to 1 in 100, and that similar agglutinins were found in over 70 per cent. of all the cases of mania subsequently examined, while control persons and insane patients who were not suffering from mania only gave agglutination in a proportion of 15·8 per cent. This single successful blood observation was of immense service in stimulating further research, but it was obvious that blood observations alone would not yield satisfactory results.

With the help of my assistants I therefore turned my attention to the bacterial examination of the urine. In the male cases the urine was passed directly into sterile urine glasses, and in the women urine was drawn by means of a sterilised catheter. By neither of these methods can sterile urine be obtained, because the urethra invariably contains organisms which are either washed out by the urine or infect the catheter employed. I trust to the fact, however, that if we obtained an infecting organism the blood serum of the patient would agglutinate it, and this was the test which we employed in every case to separate the infecting from the non-infecting organisms. Control serums were, of course, used in every case.

The first fact which we noted in the urine observations was that the urine of patients suffering from mania contains, when examined microscopically, a very large number of various forms of organisms. To control this observation, we examined the urine of healthy males and compared the results with those obtained from the examination of the urine of male patients suffering from mania. The method of examination was conducted as follows. The urine, immediately after being passed, was taken to the laboratory. Thirty c.c. were divided equally between two sterile centrifuge glasses and subjected to centrifugation for ten minutes. The supernatant fluid was then pipetted off, leaving 1 c.c. in each glass. A sample was taken from each glass and examined microscopically, and the remainder was then distributed equally between two agar plates, allowed to solidify, and placed in the incubator at 37° C. to incubate for twenty-four hours. The urine of the maniacal male patients was found to present microscopically great numbers of bacteria, chiefly coccal organisms, while the urine of five control males showed only a very small proportion of organisms. In spite of the fact that the urine of the maniacal patients when examined under the microscope presented a large number of organisms, in several instances the number which actually grew upon the agar plates was very small in proportion. On the other hand, the urine of the control males when incubated on agar plates presented often as many as 300 colonies in each plate. It is inferred from this that a large percentage of the organisms in the urine of the maniacal patients were dead, and had probably been excreted by the kidneys, while the organisms in the control urines were living and had probably been washed out of the urethra. Counting both male and female cases, the urine was bacterially examined in twenty cases, and from the organisms so obtained only two were agglutinated by the blood serum of the patient yielding the organism. Control sera failed to agglutinate either of these organisms. Both organisms were short streptococci. In none of these patients was the urine offensive, nor did we suspect bacillurea until microscopic examination was made. According to the researches of Adami, the presence of organisms in the urine may be explained as follows. Adami found that if the livers and kidneys of apparently healthy animals were removed with antiseptic precautions and placed in agar and incubated, organismal growth was obtained in nearly every case. He believes that under ordinary conditions the leucocytes pass out through the mucosa on to the free surface of, more especially the alimentary tract, some of these cells there undergoing destruction, while others, now laden with various foreign matters, including bacteria, pass back into the submucosa and find their way into either the lymphatic channels or into the portal venules. Such isolated bacteria which may have escaped leucocytal destruction or removal by the lymphatic glands, or by the endothelium of the portal system, may pass either through the thoracic duct, or through the liver, and enter the systemic circulation, from which they are eliminated chiefly by the kidneys. Such a condition is known as "latent infection" or "latent microbism," and is compatible with perfect health.

The intestinal tracts of patients suffering from mania present, post-mortem, catarrhal areas. Dr. Ford Robertson, the pathologist of the Scottish asylums, examined such a condition in the ileum of a very acute case of mania of the confusional type who died in the typhoid state. His report is as follows: "In the ileum the mucosa was narrowed, the villi were diminished in number, fibroid and atrophied. There was great increase of interglandular fibrous tissue, and the bases of many of the glands were in consequence widely separated from one another, while the submucosa showed fibrous thickening." In his opinion the condition was one of severe chronic atrophic catarrh. There were also in this case fatty changes in the epithelial cells of the liver. I have noticed similar changes in the small intestines of nearly every case of mania examined post-mortem. The presence of such lesions may possibly explain the presence of such numbers of organisms in the urine, as a catarrhal condition of the intestine would naturally favour the presence of leucocytes which would be attracted to the area by chemiotaxis.

The fifteen blood and twenty urine bacterial observations had so far, therefore, yielded only three organisms which were agglutinated by the blood serum of the patients from whom the organisms were obtained; but beyond the fact that they all belonged to the streptococci group, they differed somewhat from one another in their growth characteristics and in their agglutinating sensibility when tested with the serum of various cases of mania. The researches of Adami, however, naturally suggested the intestinal tract as a field for bacterial investigation. We therefore made cultures from the fæces of cases of mania. The technique was as follows. A small portion of the fæces was taken immediately after being passed. A straight platinum needle, sterilised by flame, was charged once from the centre of the mass, and successive stroke cultures were then made on a series of six agar tubes, three strokes being made upon each tube. These tubes were then placed in the incubator and incubated at a temperature of 37° C. for a period of twenty-four hours. Twenty-seven observations were made on twenty-seven different cases, and it was noted that colonies of cocci were very numerous in the bacterial flora of fifteen of these maniacal patients (Chart 1). Upon examination it was found that these colonies of cocci were in almost every case streptococci. Control observations made upon the fæces of healthy persons and cases of insanity other than the subjects of mania very rarely yielded more than one or two colonies of streptococci, whereas in some of the maniacal patients the streptococci were by far the most numerous organisms present. Houston, in examining the bacteriology of the fæces in twenty healthy persons, found streptococci in excess in one case. Subcultures were made from these colonies of streptococci obtained from the fæces, and each individual patient's serum was tested to broth cultures of these organisms to ascertain if specific agglutinins were present. Control sera for healthy persons were used in every case to check the agglutinating experiments. Organisms, to which such agglutinins could be demonstrated to exist in the patient's serum and to be absent from the sera of control persons, were found in six of the maniacal patients. In one case the same organism was isolated both from the urine and the intestinal tract. The mere presence of large numbers of streptococci in the intestinal flora was no indication that specific agglutinins would be found in the blood serum of the patient. For instance, in one patient ten different colonies of streptococci were isolated from the fæces, but the patient's serum agglutinated only one of them. In another case fourteen colonies of streptococci were examined, but none of them was agglutinated by the patient's blood serum. In many instances the streptococci obtained were agglutinated both by the patient's serum and the control sera, while in other cases the control sera produced rapid agglutination, but the organism was not affected by the patient's serum.

The characteristics of these eight organisms obtained from the blood, urine, or fæces are as follows:—

Microscopically they appear as short chains of four, five, six, seven, and eight cocci, or just as frequently as diplos. They stain readily with all aniline dyes, and they hold Gram's stain. They all grow at the ordinary atmospheric temperatures except No. 1, obtained from the blood, which, when first grown on artificial media, showed no capacity for growth at the room temperature, but was capable of long life under such conditions, as an inoculated agar tube, after being kept for a month at room temperature, upon being incubated for twenty-four hours at 37° C., produced a characteristic growth. After passing through several subcultures, this organism was found to have acquired the power of growing at ordinary temperatures. In broth they all form a uniform turbidity in less than twenty-four hours, and they turn the media acid. Stab cultures in gelatin grown at 22° C. show as a pale clear streak, which in all eventually becomes feathery along the edges. There is little surface growth. No. 1, after being subcultured for two years, was found to liquify gelatin, a characteristic which it did not possess when first obtained. Stroke- and smear-cultures on sloped nutrient agar tubes grow as thin bluish-white streaks or smears, which under magnification are seen to consist of numerous small translucent colonies. The size and opacity of these colonies differed considerably in some of the organisms when first obtained, but after several subcultures had been made they all tended to one type of growth. All grew in litmus milk, which was curdled by four of the eight organisms, while the blue litmus was changed to red by seven.

When tested on animals, their action was obscure. Intravenously in rabbits in doses ranging from 0·1 c.c. to 2 c.c., they produced a slight febrile reaction. Intraperitoneally in rabbits in doses ranging from 0·5 to 5 c.c., they produced no outward result, but young rabbits so infected almost invariably developed paralysis of the hind-quarters in from one to two months from the date of infection. Several of these infected animals died, but no lesion could be demonstrated post-mortem. In one, however, a pure culture of a streptococcus was isolated from the heart blood, which in appearance, growth characteristics, and to a slighter degree in its agglutinating properties, resembled the infecting organism.

Subcutaneous injections of doses ranging from 0·1 to 2 c.c. produced no suppuration, but repeated injections produced rapid loss of body weight, although the animal continued to take food well and did not appear to be ill. The fact that these organisms are not pus producers separates them from the pyogenic streptococci and allies them to the *Micrococcus rheumaticus.* Attempts were made to immunise two goats with the view of obtaining an antiserum, but both animals rapidly lost weight, and the injections were discontinued. Neither appeared to be ill, they took food greedily, and were active and energetic. Both died some months after the injections had been discontinued, apparently of some intercurrent disease the nature of which I did not understand.

A sheep which was immunised by weekly injections of doses commencing at 1 c.c. of mixed broth cultures of four of the organisms, the dose being gradually increased to 4 c.c. at the end of six weeks, very rapidly lost weight, but was otherwise apparently healthy. Serum was taken from both the goats and the sheep and tested in the laboratory, and also used in the treatment of cases of mania. In the laboratory no immune body could be demonstrated *in vitro,* and when injected into cases of mania in doses ranging from 10 to 20 c.c., the only result noticed was a fall in the pulse rate. Although these attempts to produce antiserums were unsuccessful, I still believe that there is a field for the use of antiserums in such cases. According to Ehrlich's theory, in a condition of toxæmia the patient's blood contains toxin molecules which gradually stimulate the cells of the body to throw out antitoxin molecules, which by combining with the toxin molecules render them inert. When one immunises an animal against toxins, these antitoxin molecules are in excess in the blood serum of the immunised animal, and it is probable that the injection of a large dose of such antitoxic molecules into a patient suffering from mania would produce a temporary remission sufficiently prolonged to allow of the natural defensive processes of the body to come into play. A polyvant serum would, of course, be a necessity, as the streptococci found in connection with these disease processes are not identical.

Having failed to obtain an efficient antiserum, it occurred to me that the patients might form their own immune bodies if dead cultures of the organisms which they agglutinated were injected subcutaneously. The earliest of these observations were made before Wright published his researches on opsonins, and pointed out the necessity for the exhibition of small doses. The initial doses of vaccine used at Murthly were all too large. It was found that the injection of a 0·5 c.c. dose of a broth culture of these organisms when injected subcutaneously into a maniacal patient produced an exacerbation of the mental symptoms, corresponding to Wright's negative phase. This was followed by a temporary improvement corresponding to Wright's positive phase, but the results were very transitory, and in several patients, after a period of treatment extending over six weeks, no immune body could be demonstrated to exist in the blood serum when tested *in vitro.* During and corresponding to the positive phase, the polymorpho-nuclear leucocytes were always increased. After Wright published the results of his researches upon the opsonic indices in tubercle and *Staphyloccus aureus,* we examined the opsonic power of the blood serum in our maniacal patients, using as the testing organism the variety of streptococcus which each particular patient agglutinated. These observations were continuous in each case, and in some instances we were fortunate enough to obtain records throughout the whole period of short attacks of manic-depressive insanity and of confusional mania.

With the help of my assistant, Dr. C. J. Shaw, I made control observations on members of the asylum staff.

I am also able to show you opsonic index charts in the case of chronic rheumatic arthritis, and the control who suffered from a fissure of the tongue. The testing organism used in the case of rheumatic arthritis was the *Micrococcus rheumaticus,* a culture of which was kindly given to me by Dr. Dowson of the Wellcome Research Laboratory. And the testing organism used in the case of tongue fissure was a variety of streptococcus which the patient's serum partially agglutinated.

In estimating the opsonic index, we followed the technique introduced and described by Wright. An emulsion was made from a twenty-four hours' agar culture of the organism, which when necessary was shaken up with sterilised glass beads to insure subdivision of the cocci. Blood corpuscles, usually taken from a control person, were washed in 1 per cent. citrate of soda solution and then in normal saline. A sufficient quantity of serum was obtained from the patient and also from a control subject. It is certainly more accurate to mix two or three control sera, but we were not able to do this frequently, but we tested our control sera every now and then against one another, and found them fairly steady in their reaction.

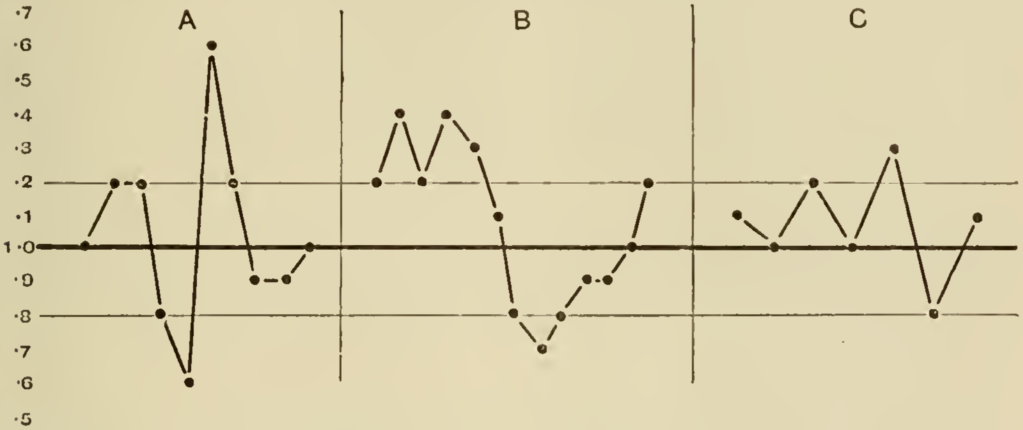
Equal quantities of emulsion, blood corpuscles, and serum were then mixed, drawn into a capillary tube, and incubated for fifteen minutes at 37° C. The contents of the capillary tubes were then blown on to slides, made into a film, dried and stained. The films were then examined under a microscope, the oil-immersion lens being employed, and the number of organisms, ingested by thirty, forty, fifty, or sixty polymorpho-nuclear leucocytes, were counted in both the patient's and the control films. The number of organisms ingested by the polymorpho-nuclear leucocytes in the patient's film were divided by the number of organisms ingested by an equal number of polymorpho-nuclear leucocytes in the control's film—the result being the opsonic index of that patient to the particular organism used in the observation.

The average opsonic index of health as found by Wright and other observers to tubercule and staphylocci varies between 0·8 and 1·2, and in the charts which I will show you I have adopted these limits as the limits of the opsonic index in health to these streptococci, as to the best of my knowledge no data exist as to the average index in health to any of the organisms of the streptococci group.

Chart 2 shows the opsonic indices of members of the asylum staff to one of the streptococci isolated from a case of confusional mania. The sera of Cases A and B both agglutinated the red blood corpuscles of healthy persons, which reaction, as stated in an earlier lecture, is presumptive evidence in favour of some form of coccal toxæmia, although both were apparently in perfect health. The serum in Cases C did not agglutinate the red blood corpuscles in healthy persons. It will be noticed that the variations in the opsonic indices of these control persons are marked, much more so than in the case of tubercule, but when one comes to compare these charts with the charts of cases suffering from mania, the fluctuations in the indices of the maniacal patients are more marked than in the control persons.

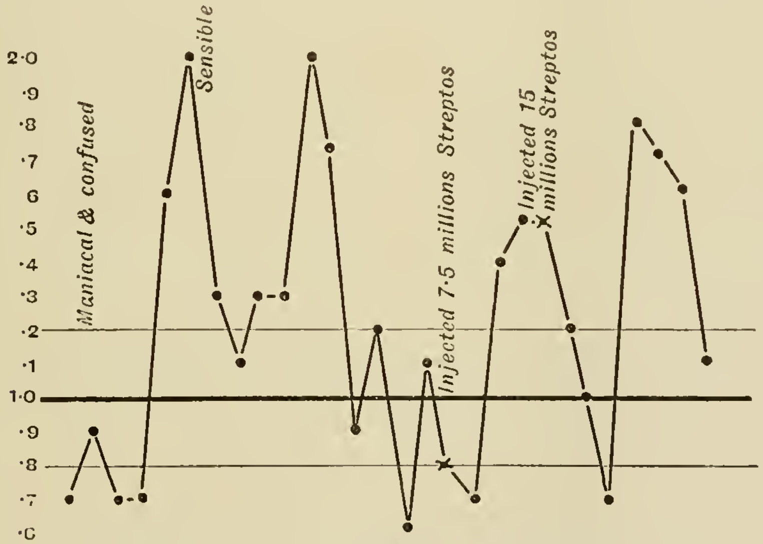
Chart 3 shows the opsonic index in the case of a female adolescent suffering from acute mania of the confusional type. The patient was admitted in a state of wild delirious excitement, and a culture made from the fæces gave a rich growth of streptococci, one colony of which the patient's serum agglutinated in dilutions up to 1 in 50. This organism was used in estimating the opsonic power of the patient's serum.

For the first four days the patient was maniacal and delirious, and the index was low. On the fifth day the index rose to 1·6, and on the sixth day to 2. On that, the sixth, day the patient became conscious of her surroundings. Two days later the index had fallen to normal, and this was again followed by a marked rise or positive phase and a subsequent fall. During the whole of this period the patient was sensible, quiet, sleeping well, and progressing favourably. On the seventeenth day I injected 7½ millions of dead streptococci killed by heat. The following day the index fell to 0·7, and the patient was slightly dull and apprehensive. This was followed by a marked positive phase, which lasted for three days, during which the patient was in good mental health. I then injected 15 millions dead streptococci, and this dose was followed by a prolonged negative phase lasting for three days, during which the patient was dull and confused. This was succeeded by a marked positive phase associated with mental clearness. The patient made an excellent recovery



Opsonic Indices in Control Cases

CHART 2.



Opsonic Index. Acute Mania (Confusional)

CHART 3.

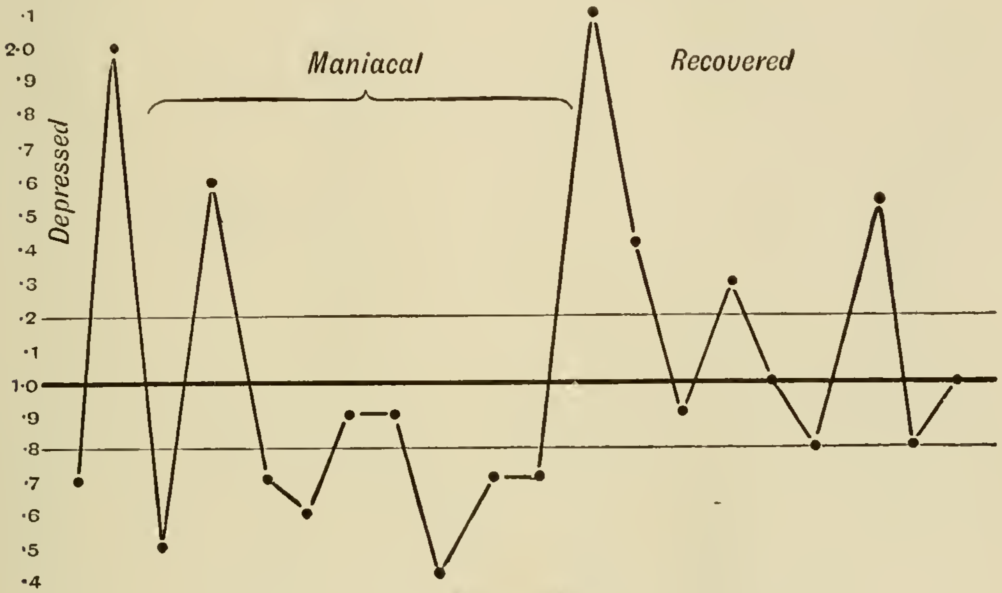
without suffering from any relapses, which are extremely common in adolescent cases, but whether in spite of or because of the treatment it is impossible to say.

Chart 4 shows the index in a very acute case of delirious mania in a young male epileptic. For the first seven days the index was never above 1, and on two occasions as low as 0·4. Then a sudden rise to 2 occurred, with some mental improvement. On the eleventh day I injected 7½ millions streptococci, and this injection was followed by a fall or negative phase which lasted for two days, and this was succeeded by a positive phase lasting for two days. On the sixteenth day another injection of 7½ millions dead streptococci was given, and was followed by a marked fall or negative phase with exacerbation of the mental symptoms, and this was succeeded by a marked rise or positive phase reaching 2·4, accompanied by decided mental improvement.

Chart 5 shows the opsonic index in a case of chronic mania of the confusional type, occurring in an adult woman who had been ill for more than two years. The organism used in this case was the streptococcus obtained from the blood of the case of acute confusional mania. It will be noticed that the positive and negative phases follow one another with great regularity, and whenever the index fell below normal, a marked exacerbation occurred in the mental symptoms. Such a chart, interpreted according to our present knowledge of the opsonic index, would read as follows. The chart commences with a positive phase succeeded by a mild auto-intoxication which stimulated another positive phase. Then follows a more marked auto-intoxication, producing a decided negative phase, accompanied by excitement and noise. This is again succeeded by a positive phase with comparative mental improvement. Lastly, a still more marked auto-intoxication producing a negative phase lasting for four days, and again a reaction of the body to the toxins represented by a positive phase.

It will have been noticed in all the charts which I have shown, that the positive phases are extremely short, whether they occur as the result of auto-intoxication or as the result of the injection of dead bacteria.

Chart 6 shows the opsonic index throughout an attack of maniac-depressive insanity. The patient, a woman æt. 55, suffered from repeated attacks every three or four months. Each attack was short, rarely lasting for more than two or three weeks. The index throughout two separate attacks was observed, and it was practically identical on both occasions. On the first day the mental symptoms were those of depression with an index of 0·7, then follows a marked rise to 2, followed by a fall to 0·5. The patient became maniacal on that, the third day of her illness, and with the exception of a rise of the index to 1·6 on the fourth day, the index was low for eight days, during which the maniacal symptoms were most acute. This period was followed by a sudden rise to 2 with marked mental improvement, and a subsequent index which closely approached the normal line associated with a rapid convalescence and recovery. This chart reads as follows:—Auto-intoxication with a negative phase and a subsequent positive phase. A further auto-intoxication with an abortive attempt at a positive reaction followed by a long negative phase lasting seven days. A mastering of the toxins shown by the return of the positive phase with a subsequent persistence of high opsonic power associated with recovery.

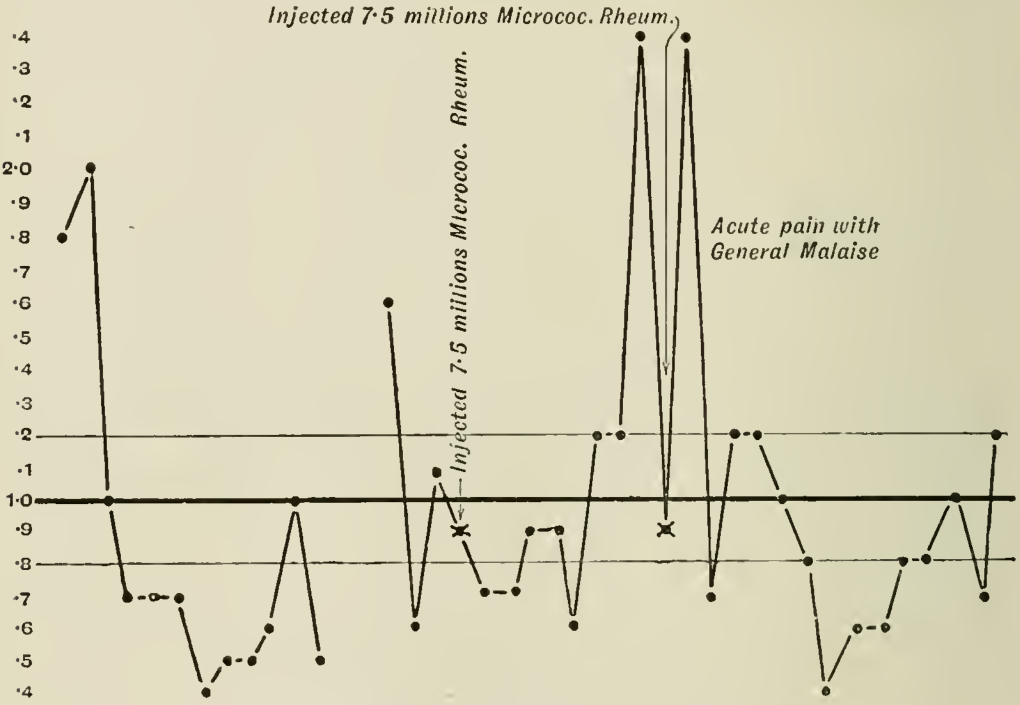


Opsonic Index. Mania (Manic-depressive)

CHART 6.

Chart 7.—As an interesting comparison I show the opsonic index in the control case suffering from fissure of the tongue. The subject, a member of the asylum staff, volunteered to act as a control in some observations which were being made on the tubercule opsonic index, and at the same time the opsonic power of the blood serum was tested to one of the streptococci isolated from a case of confusional mania. The leucocyte chart, which was shown during the previous lecture, indicated that there was some source of toxæmia unknown to us, and we subsequently discovered that the lesion was a fissure of the tongue. It will be noticed that the index in this control upon two occasions rose much above the limits of health. The subject was apparently in excellent health, but the blood serum agglutinated the red blood corpuscles of a healthy person.

Chart 8 is also an interesting comparison with those of maniacal patients, as being the index of a sane person suffering from chronic rheumatic arthritis to the *Micrococcus rheumaticus*, who was also injected with vaccines of the organisms. The chart starts with a marked positive phase, succeeded by a prolonged negative one, during which the patient suffered from nausea, intestinal disorder, and acute pain and swelling in the joints. The chart restarts with a positive phase, and on the fourth day an injection of 7½ millions of dead *Micrococcus rheumaticus* was given. This was followed by a decided negative phase during which the patient suffered from a rheumatic attack, and this was followed by a positive phase with a return to comparative comfort. Next day another injection of 7½ millions of *Micrococcus rheumaticus* was given, which was followed by first a rise and then a prolonged fall of the index, and again the patient suffered from malaise and rheumatism.



Opsonic Index. Rheumatic Arthritis

CHART 8.

When one compares such a chart made in the case of a person suffering from a disease which is almost certainly bacterial in origin with those made in the subjects of mania, there is a very marked similarity between them, both in the extreme variations of the index and the associations of the rheumatic and maniacal symptoms with the periods of the negative phases.

SUMMARY OF LECTURE III.—As the result of bacterial observations on the blood of fifteen patients suffering from mania, a streptococcus was isolated from the blood of one case of confusional mania. The blood serum of this patient agglutinated the organism in a dilution of 1 in 100, while the serum of few control persons gave agglutination. The blood of the remaining fourteen cases of mania was sterile. It may be surmised, therefore, that organisms are not frequently present in the blood of maniacal patients.

As the result of bacterial observations upon the urine of twenty patients suffering from mania, it was noted that the urine of these cases when centrifuged and examined microscopically presented a large number of organisms, chiefly cocci. The urine of five control males when centrifuged and examined microscopically presented very few organisms. Cultures made from the centrifuged urine of the maniacal patients presented comparatively few colonies of organismal growth, considering the number of organisms seen microscopically. On the other hand, the urine of the five control males when inoculated on agar plates and incubated for twenty-four hours at 37° C. showed a large number of organismal colonies. It is inferred from this that the organisms in the urine of the maniacal patients were largely dead, and had been probably excreted through the kidneys, while the organisms in the urines of the five control males were living and had probably been washed out of the urethra. The excretion of organisms in the urine of maniacal patients may be explained from the fact that the small intestines of these patients when examined postmortem present evidences of atrophic catarrh, which would favour phagocytic action by the leucocytes. Two streptococcal organisms were isolated from the urines of the maniacal patients. These streptococci were agglutinated by the blood serum of the patients yielding the organisms, while the blood sera of control persons gave no agglutination.

A bacterial examination of the fæces in twenty-seven patients suffering from mania demonstrated the fact that in 59 per cent. of these cases streptococci were very numerous, so numerous that in two instances no *Bacillus coli* were present. Houston in examining the bacteriology of the fæces in healthy persons found an excess of streptococci in one case out of twenty examined.

Six streptococci, which were agglutinated by the blood serum of the patients yielding the organisms but not by the sera of control persons, were isolated from the fæces of the twenty-seven maniacal patients examined.

As the result of animal inoculations with these various streptococci isolated from the blood, urine, and fæces of maniacal patients, it was found that these organisms were not pus producers, which separates them from the pyogenic streptococci and allies them to the *Micrococcus rheumaticus*.

Attempts to produce antiserums to these organisms by inoculating two goats and a sheep failed.

Attempts were made to immunise the patients by injections of vaccines made from these organisms. It was found that large doses produced an exacerbation of the mental symptoms. Several patients were treated for periods of six weeks with weekly injections, but when, at the end of that period, their blood serum was examined, no immune body could be demonstrated *in vitro.*

The opsonic indices of several maniacal patients, when tested against some of the streptococci above mentioned, are very suggestive of a bacterial toxæmia, particularly the negative phase which follows the injection of vaccines made from these streptococcal organisms.

As the result of these observations, I believe that the diseases known as mania are conditions of brain poisoning, the poison or toxin in every case being a bacterial one. The bacteria causing these toxæmias are probably streptococci, and the point of attack is almost certainly the intestinal tract.

My explanation of the disease process is as follows:—Owing to some lowering of the bacterial defences, certain strains of cocci become unduly increased in the intestinal tract. These cocci do not actually enter the blood stream, but they form toxins in the intestine which are absorbed by the blood vessels and lympatics in such quantities as to escape destruction in the liver and lymphatic glands, and they thus pass into the general circulation. These toxins have a selective affinity for the most highly developed nerve structures of the brain, to which they are carried by the blood stream. When the toxin molecules are present in the blood stream in sufficient quantity to produce an acute brain intoxication, then an acute attack of mania is the outward result. When the poisoning is more gradual, then there is a gradual deterioration of the brain tissues, showing itself in eccentricities and changed character, which may lead finally to a chronic delusional state. The presence of toxin molecules, however, in the blood stream inevitably leads to the formation of antitoxin. The toxin molecules stimulate the cells of the body to throw out antitoxin molecules, which by combining with the toxin molecules render them inert. When a maniacal patient makes an apparent recovery,the antitoxin molecules have for the time being neutralised the toxin molecules, and so we have a cessation of the symptoms. On the other hand, a lowering of the general bodily health or a failure on the part of the cells to form a sufficient number of antitoxin molecules, immediately allows of the toxin molecules again to go free, further poisoning takes place, and another attack of mania is the result. The cause of the whole process, the streptococci in the intestinal tract, remain a source of danger, as they are unaffected by the formation of antitoxins, which cannot reach them in the intestine. This is not a mere hypothesis, because on examining the bacterial flora of the intestine in the cases of two patients who had recovered from confusional mania, I still found streptococci in almost as great numbers as when the patients were acutely maniacal.

It has been urged as an argument against the bacterial origin of mania, that such a disease as pneumonia will sometimes cause a condition of delirious mania, and sometimes arrest an attack of mania. This is perfectly true, but one must remember that pneumonias are not always due to the action of one organism. The only case of pneumonia causing mania which I have been able to observe died, and post-mortem a pure culture of a streptococcus was isolated from the pneumonic patches in the lung. This organism was not the pneumococcus, but a short streptococcus closely allied to the group which I have isolated from cases of mania. It was not fatal to rabbits by intravenous, intraperitoneal, or intrapulmonary injection. A small quantity of the blood serum obtained from the patient the day prior to death rapidly agglutinated this organism in dilutions up to 1 in 100. The intestinal tract in this patient presented the same appearances of chronic catarrh similar to those observed in cases of uncomplicated mania dying from exhaustion. This was evidently a case in which the pneumonia was the last straw in precipitating the manical attack. The pneumonia and mania were in short only the terminal stages of a prolonged intestinal toxæmia. The cases of pneumonia which promote recovery in states of mania are always in my experience associated with high fever and hyper-leucocytosis, and were probably caused by the pneumococcus or some allied pyogenic organism.

In spite of all that has been said to the contrary, acute inflammatory conditions undoubtedly cut short attacks of mania, but these inflammatory conditions are always associated with high temperature and hyper-leucocytosis. The high temperature alone has some bactericidal action, of which we are at present only dimly conscious. Aurebach noted that a temperature of 108° F. rendered alkaline culture media bactericidal, and he argues that in acute infections the pyrexia, although it diminishes the alkalinity of the blood, at the same time may be beneficial in that it also increases its bactericidal power. A genuine inflammatory or infective leucocytosis, plus fever, is a much more potent defensive agent than a leucocytosis excited artificially with which there is no fever. I have undoubtedly cut short attacks of mania by injections of vaccines made from virulent cultures of *Streptococcus pyogenes*, turpentine, and similar agents, which promote recovery by the hyper-leucocytosis which they induce; but such injections often fail, and they fail, I believe, because one does not produce the temperature and leucocyte reaction of a true inflammatory process.

A RÉSUMÉ OF THE REPORT OF THE ROYAL COMMISSION ON HUMAN AND BOVINE TUBERCULOSIS.

By J. S. Fowler.

The Royal Commission on Tuberculosis, which was appointed in 1901, has lately issued a second interim Report.[1] It will be within the recollection of most readers that the Commission was appointed as an outcome of Professor Koch's famous pronouncement in that year, that bovine tuberculosis was seldom, if ever, a cause of the disease in man. The exact reference to the Commission was, to inquire and report—(1) Whether the disease in animals and man is one and the same; (2) whether animals and man can be reciprocally infected with it; and (3) under what conditions, if at all, the transmission of the disease from animals to man takes place, and what are the circumstances favourable or unfavourable to such transmission. In the seven years which have elapsed since the Commission was appointed, interest in the tuberculosis problem, so far from fading, has spread among all classes, and, as this résumé will show, the observations and conclusions of the Commission are of great importance in their bearing upon one of the practical questions of the day.

The Report covers two parallel lines of inquiry, namely, an investigation of the effects produced on animals by the introduction of (1) the bacillus of human tuberculosis, and (2) the bacillus of bovine tuberculosis.

Bovine Tuberculosis.—In the experimental infection of animals with bovine tuberculosis several factors have to be considered. These are, the species of animal, the nature of the virus, and the channel of infection. The results which ensue upon the effective *subcutaneous inoculation* of a calf, heifer, or other bovine with tuberculous virus are (*a*) a local tuberculous swelling progressing to caseation, (*b*) tuberculous deposit on the adjacent glands, followed about the twelfth day by (*c*) fever and constitutional disturbance. The disease is fatal in from twenty to fifty days, and post-mortem examination shows *acute generalised progressive tuberculosis.* For purposes of comparison, an effective fatal dose of virus is taken to be one which will cause death in this way within ninety days. In other cases the local lesion is smaller, the swelling of the adjacent glands is temporary, the general constitutional disturbance subsides, and the animal recovers. On examination of the body, the lesions are mostly localised, and even if distant foci exist, all show evidence of being *retrogressive.* Between the two extremes of acute progressive and retrogressive tuberculosis, many intermediate types occur. Which of these two main types of tuberculosis follows inoculation depends to some extent on the resistance of the animal: this, of course, is not a mensurable factor. To a much larger degree, however, it is governed by the *dose* and the *nature* of the virus. The viruses employed were either *cultures of bacilli* or *emulsions of tuberculous lesions.* As the following figures indicate, the latter are enormously more active than the former. Fifty mgrms. of culture practically always, from 10 to 25 mgrms. often, and 5 mgrms. on one occasion, set up acute progressive tuberculosis. Doses of 0·02 and 0·01 mgrm., with equal regularity caused only a limited retrogressive infection. In 0·01 mgrm. of culture there are about 50,000,000 bacilli, and a considerably smaller dose than this, introduced as an emulsion of tuberculous organs, produces acute fatal tuberculosis equal in intensity to that caused by 50 mgrms. of culture. The smallest dose of culture which caused fatal progressive tuberculosis was 20,000 to 25,000 millions bacilli, while a dose of 9000 bacilli, or even a little less, given as emulsion, was able to produce general tuberculosis in some animals.

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[1] "Second Interim Report of the Royal Commission appointed to inquire into the Relations of Human and Animal Tuberculosis," London, 1907.

The most conspicuous fact observed in cases of intra-mammary inoculation was a greater tendency for the disease to remain localised (even to the quarter of the udder inoculated), and for the general health to remain undisturbed, than in ordinary subcutaneous injections.

Effect of feeding calves with bacilli of bovine tuberculosis.—The noteworthy point in connection with this line of research is the difficulty in causing generalised progressive tuberculosis. Of twenty calves fed with large doses of virulent bacilli, only one succumbed. The rest, in most cases, showed merely a limited retrogressive tuberculous infection.

Effect of bovine tubercle bacilli on other animals.—Observations made on guinea-pigs, rabbits, goats, pigs, dogs, cats, rats, and monkeys proved that all these may be infected either by inoculation or by feeding. Some are less susceptible than bovines, and others—guinea-pigs, pigs, and monkeys—more so. The feeding experiments with monkeys are particularly instructive, considering how nearly these animals are related to man. Whether the bacilli were administered as cultures, or in tuberculous milk derived from cows with diseased udders, the result was in almost every case the same—generalised progressive tuberculosis. The monkey tribe, therefore, appears to be much more susceptible to infection through the alimentary tract than are bovines themselves. The exact figures in the case of one chimpanzee may be quoted: 107 c.c. tuberculous milk containing about 10,000,000 bacilli caused the animal's death in 144 days. Post-mortem, there was tuberculous ulceration of the bowel, and caseation of the mesenteric glands.

Human Tuberculosis.—Viruses obtained from sixty cases of tuberculosis in man were studied. Before referring to the results obtained, it will be convenient to summarise very shortly the Commission's findings concerning the *bacteriology of the tubercle bacillus* in general. By the use of different media they find that the bacillus varies considerably in the luxuriance of its growth in culture. Bacilli which flourish luxuriantly they term "eugonic," those which grow with difficulty they call "dysgonic." Going on this plan, bacilli can be divided into five grades, Grade I. being most dysgonic, and Grade V. most eugonic. The bacillus of bovine tuberculosis belong to Grades I.–III.; bacilli from cases of human tuberculosis are distributed over all the Grades, I.–V.

From a study of the effects which the different viruses obtained from tuberculosis in man produce in animals, the Commission divide the viruses into two groups. Group I. consists of those which gave results precisely similar to what have been described under the head of bovine tuberculosis; Group II. gave results which differed conspicuously, in being very much less pronounced. And farther, the cultural and microscopic characters of Group I. are identical with those of the bovine bacilli; while, with the exceptions afterwards to be mentioned, the cultural characters of Group II. differ from the preceding, in that they are less dysgonic and are distributed over Grades IV. and V.

These facts assume peculiar significance when we come to consider the sources of the different viruses. Fourteen cases are included in Group I.; ten were primary abdominal tuberculosis; three, cervical glands, and one, sputum. Group II. is much larger, there being forty cases, of which eight were primary abdominal tuberculosis, ten tuberculosis of respiratory origin, one tuberculosis of the kidney, one tuberculosis of the testis, nine, bone and joint disease, and the rest cervical glands. That is to say, the majority of the cases yielding virus which resembles that of bovine tuberculosis were examples of primary abdominal infection, which suggests that the disease was due to swallowing tuberculous milk; the majority of the cases yielding a virus which does not resemble that of bovine tuberculosis were examples of infection arising outside the alimentary tract, and mostly of respiratory origin.

It is unnecessary to give the details of the experiments with Group I. The effects on cattle and other animals were "absolutely identical" with those of bovine virus—"both are equally virulent." Turning to Group II., subcutaneous inoculation of emulsions produces in bovines a limited local lesion which does not infiltrate the surrounding tissues, and tuberculous deposits in the neighbouring glands. However well marked these changes are, they are always retrogressive, and the local lesion may even subside entirely. Measured doses of culture, from 5 mgrms. up to so much as 3000 mgrms., produce no more than a limited retrogressive tuberculosis, chiefly local. In guinea-pigs and monkeys, on the other hand, generalised tuberculosis is readily caused by Group II.; pigs and rabbits, however, are as insusceptible to it as bovines are.

Comparison of Bovine and Human Tuberculosis.—In their histological and anatomical features the lesions are the same in both types. The changes produced by Group II. in cattle and rabbits differ *only in degree* from those produced by Group I. and bovine bacilli, while in the more susceptible monkey and guinea-pig the effects of all are identical.

While the bovine bacillus and Group I. are evidently the same, the difference between them and Group II. are sufficient to raise questions as to their identity. As against there being any essential difference, there are the following facts:—(1) Certain strains of bacilli (Group III., afterwards to be described) which came under the observation of the Commission were found to be possessed of virulence intermediate between Groups I. and II. (2) No evidence has been obtained of any specific differences in the two sets of bacilli as regards variation in their virulence to different animals. That is, the bovine bacillus being more virulent to certain species than it is to bovines, no case has occurred in which the human bacillus was more virulent to any species than the bovine was; thus there is no reason for supposing that the differing virulence differs also in kind.

The consequences of infection with Group I. are indistinguishable from naturally occurring bovine tuberculosis. Group I. were examples of the infection of human beings by bovine tuberculosis conveyed through the alimentary tract, therefore an affirmative answer is given to the query, Can man and animals be reciprocally infected with tuberculosis?

Strictly speaking, however, it has not so far been proved that human and bovine tuberculosis are the same; it might be urged that all that has been shown is that some of the cases usually called human tuberculosis are really bovine tuberculosis occurring in man. For an answer to this, let us compare Groups I. and II., and consider the intermediate Group III.

Groups I. and II., though they differ in virulence, do so only in degree, not in kind. They differ also in their cultural characters, (I.) being dysgonic and (II.) eugonic. Broadly, luxuriant growth on artificial media goes along with lower virulence to animals, and *vice versa*. But the cultural differences between the least dysgonic bacilli of Group I. and the most dysgonic bacilli of Group II. is very slight. And, moreover, differences in virulence within the limits of each group do not run parallel with differences in luxuriance of growth. This raises the question, Do the bacilli of human and bovine tuberculosis exhibit instability in their characteristics under certain conditions?

Evidence pointing in this direction has been derived from certain cases of human tuberculosis, which on account of their exceptional characteristics have been classified together as Group III.—(1) Material from a case of lupus vulgaris yielded a bacillus of intermediate virulence, less than Group I. and greater than Group II. (2) Material from a tuberculous knee-joint (originally belonging to Group II.) exhibited increased virulence after passage through five calves; it became fully dysgonic, and at the same time showed all the virulent characters of bovine tuberculosis. Analogous results were also obtained from a case of abdominal tuberculosis, or a specimen of sputum. (3) As a rule, a strain of bacilli is very stable, and may be kept for a long time (up to three years) by subculturing, without any loss of virulence. Exceptions, however, occur. Thus the dysgonic virulent bacilli of one of the passage experiments became eugonic and weaker after six subcultures by the tenth month. Group III., therefore, comprises bacilli of human tuberculosis which are either intermediate in virulence, or show signs of instability. The explanation of this group is not apparent, and the matter is still an object of research by the Commission. The two possibilities are, that the material contained bacilli from both bovine and human sources, and that the passage through cattle favoured the growth of the former, or that genuine change due to altered environment took place.

Meanwhile, therefore, the Commission have not answered the first question referred to them, but they are able to give an affirmative reply to the second. The principal points drawn attention to in the conclusion of the Report are—(1) That a certain amount of tuberculosis, especially in children, is directly due to infection with the bovine bacillus. (2) That tuberculous milk is clearly a cause of tuberculosis, and fatal tuberculosis, in man. (3) That a very large proportion of tuberculosis contracted by ingestion is due to bovine bacilli. (4) That more stringent measures are required to prevent the sale or consumption of milk from tuberculous cows.

TUMOUR OF THE CAUDA EQUINA REMOVED BY OPERATION: RECOVERY.

By R. C. Elsworth, M.D., C.M. (Ed.), F.R.C.S. (Eng.), *Surgeon to the Swansea General Hospital.*

(Plate II.)

In the *Annals of Surgery* for October 1907, I reported a case of tumour of the cauda equina which was under my care earlier in the year. By a curious coincidence the present case was brought to me a few months later; and the question occurred to my mind, is this condition after all so rare as it is supposed to be? The literature on the subject is very scanty, and though the condition is far from frequent its importance is great. The diagnosis is none of the simplest, and the misery and suffering which patients endure from their condition not being recognised are extreme. These facts seem sufficient justification for publishing the present case. In its early stages the condition must be impossible to diagnose, and even as the disease advances it may readily be overlooked unless one is constantly on guard. We should do well to remember that cases of obscure pain and backache may have an organic cause which cannot be discovered by a superficial survey. These two cases are practically alike, save that the present one was of longer duration and the signs and symptoms were more aggravated, consequently the earlier one appeared more difficult to diagnose, though it may not have been so in reality. It may have been due simply to that mental inertia which prevents the mind working freshly and quickly along unaccustomed paths of thought. Suffice it to say that the condition can be diagnosed with a little care and trouble, and if the publication of these two cases serve to attract attention to this painful and distressing malady, my object will have been attained

Case 1.—Joshua K., æt. 19, Newcastle, Pa., U.S.A. He complained of pain in the lower part of the back, down the backs of the legs, and of weakness in both legs, with wasting of the muscles generally and of the legs in particular. *The history*, both personal and family, was good.

The present illness began nine years ago with pain in the legs, which has got steadily worse since that time. The wasting of the legs has been observed for several years, but he could not say how many. The pain was fixed in the lower part of the back, and was constant, though varying in intensity at different times. It was often worse in bed, especially in the morning on waking, and after exertion. From the back the pain radiated down the backs of the thighs to the feet, and was so severe that it was impossible for him to stoop forwards. The pain in the right foot was often intense, while the left foot was always numb. Early in the disease the pain was worse in the left leg and foot, but now there was numbness in the left leg and foot, while the pain was worse in the right.

With the progress of the disease he has become steadily weaker, so that when first seen by the writer on 1st September 1907 he was almost incapable of any kind of muscular exertion, even so little as maintaining himself in the erect attitude for more than a few minutes at a time. For a few weeks prior to that date he had been wearing a plaster of Paris jacket, which had afforded him some relief and enabled him to walk a short distance.

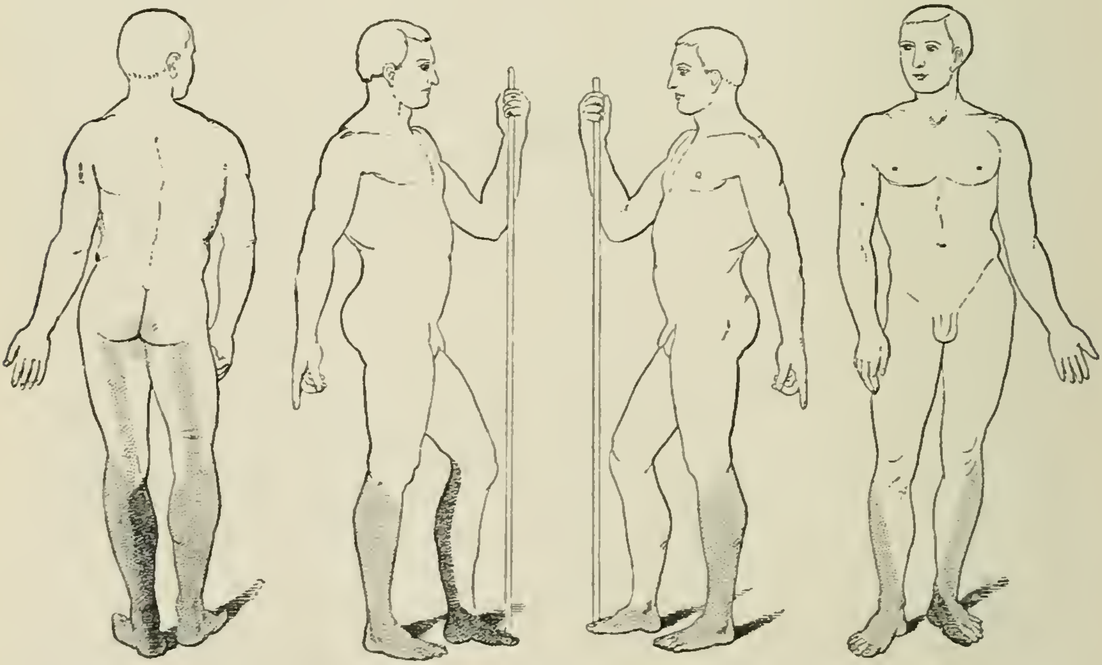
During these years the patient had consulted many medical men both in this country and in America, and as many different opinions had been expressed as to his condition. He had been treated for neuritis, sciatica, lumbago, and rheumatism. He had had courses of treatment with electricity—galvanic and faradic—X-rays and high-frequency currents. He had been ordered exercise and rest by turns, but all to the same effect. The pain continued, and his sufferings were not abated.

Present State.—The first thing which impressed one on looking at the patient was the complete absence of all signs of puberty notwithstanding his age, and secondly, the extreme emaciation, which, though general, was most marked from the pelvis downwards. Above the pelvis the muscles though small were relatively strong. But the pelvic muscles and those of the lower extremities were so wasted as to be indefinable, were very feeble, and the power of thrust very small. There was a general absence of subcutaneous fat. (Plate II.)

Muscular system.—The muscles of the pelvis, thighs, and legs were so much wasted that the contour of the buttocks and of the lower limbs was quite lost, and the patient had the appearance of one in the last stage of some wasting disease. The glutei maximi muscles were so wasted as to be indistinguishable and to allow the contour of the subjacent bones to stand out with melancholy prominence. It was difficult to be certain, but it was believed that the gluteus medius and minimus on both sides were wasted to a like extent. The hamstring muscles were reduced to mere cords, and the whole of the adductors, calf and anterior tibial muscles, and the quadriceps extensor on both sides were similarly affected. All these muscles tested in groups were found to be feeble and easily exhausted, but no muscular paralysis was present and no reaction of degeneration could be obtained.

The reflexes below the pelvis, both superficial and deep, were absent save for a very feeble plantar reflex on the right side.

Pain sensation was much diminished on the outer side of both legs and both feet and on both soles, especially the left and up the backs of both thighs.



Tactile sensation was impaired over the lightly shaded areas and was absent over the deeply shaded areas. These, it will be observed, correspond with the distribution of the fifth lumbar and first, second, and third sacral nerves. On the left side tactile sensation was completely abolished over the distribution of the first sacral nerve. In the regions not enumerated tactile sensation was unaltered.

There was no evidence of nutritive changes in the skin, bones, or joints. There was no deformity of the spine, and no external evidence of sacro-iliac disease.

Percussion of the spine revealed a tender point at the level of the fifth lumbar spine, which was so sensitive that the slightest flick caused intense pain at the spot, which radiated down the legs.

The appetite was good, and there was no evidence of disease of other organs save for some slight prolongation of expiration in the right subclavicular region. The urinary functions were unaltered.

The salient points of the case were—(1) Pain in the back and along the course of the sciatic nerves. (2) Wasting of the gluteal muscles, especially the maximi and all the muscles supplied by the great sciatics, anterior crurals and obturator nerves. (3) Pain on percussion of the spine, on bending forwards and on standing in the erect position; the pain being felt in the lumbar region and extending along the sciatic nerves. The pain was constant and had been present for nine years, the atrophy of muscles had been observed for several years, the exact number not known.

Taking these salient points into consideration, it was obvious that the lesion was bilateral, that the disease was somewhat further advanced on the left side than on the right, that the sensory phenomena predominate—witness the abolition of sensation, but no motor paralysis—and, finally, that the lesion was irritating at first and subsequently paralysing.

Differential diagnosis from sciatica, neuritis, pressure on nerves in the pelvis or at the sacro-iliac joints, pressure in the spinal canal (*a*) on the cord, (*b*) on the cauda equina; due to disease of bone or tumour. It will be observed that myelitis and the systemic diseases of the spinal cord have been left out of consideration, as they are obviously not worth discussion in this case.

Sciatica.—This was negatived by both sides being affected and by the disease not being limited to the sciatic nerves; the condition of the gluteal muscles clearly showed that the inferior gluteal nerve, at least, was involved and sciatica could not account for the pain in the back.

Neuritis.—This was negatived by the extent of the lesion, by its duration, by the absence of paralysis, and by the absence of the causes producing that disease.

Pressure on nerves from disease of the sacro-iliac joints was negatived by the extent of the lesions, by the bilateral condition, and that it was impossible to conceive disease of both joints about the same age, and producing pressure in almost exactly the same place and to almost exactly the same degree; besides, there was no evidence of disease of the sacro-iliac joints. Rectal bimanual examination also failed to reveal any evidence of tumour in the pelvis.

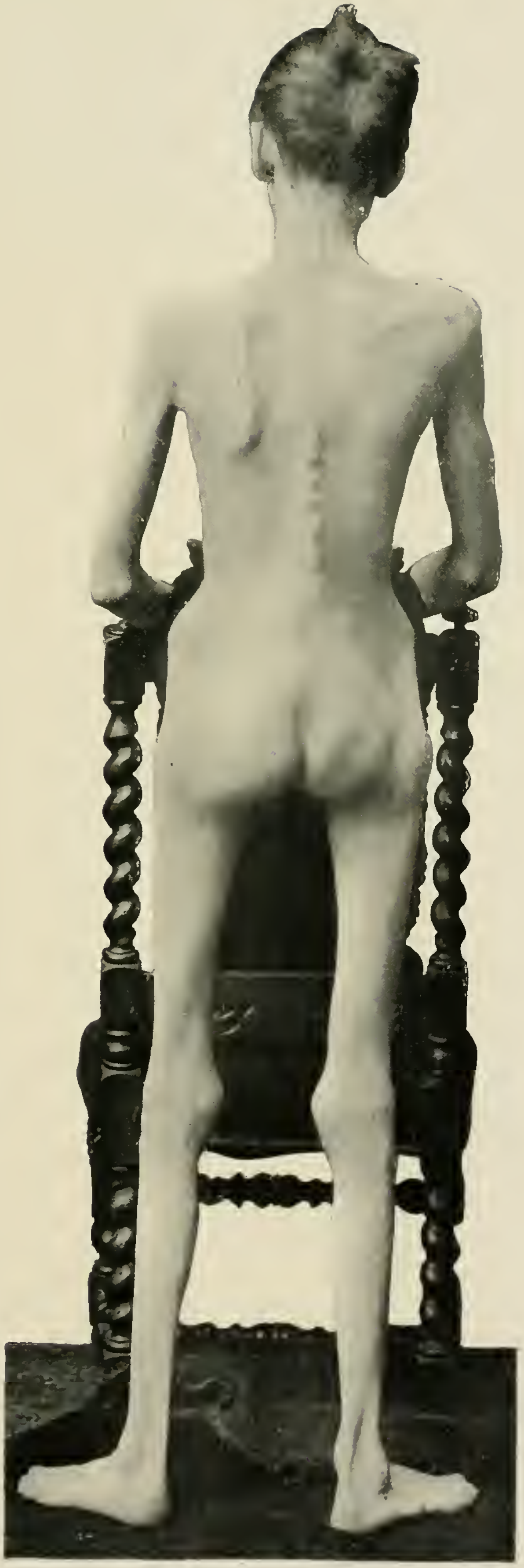
Finally, we are brought down to the spinal canal. Pressure in the spinal canal would produce all the symptoms, and that too with a comparatively small lesion. If we look at the condition presented by this patient, it will at once be obvious that the lesion from which he suffered involved the fifth lumbar nerve and all the nerves below that level on both sides of the body. That the fifth lumbar nerve was involved was shown by the condition of the gluteus maximus, which, it will be remembered, is supplied by the inferior gluteal nerve derived from the fifth lumbar and first and second sacral nerves, and that all the nerves below that point were involved was proved by the wasted condition of all the muscles supplied by the great sciatic nerve. A lesion in the spinal canal would account for all these symptoms, and such a lesion might be due to—(1) Caries of the spine, (2) tumour in the canal.

The lesion in this case, because of the symptoms and progress, must obviously be situated on the posterior aspect of the canal, so as to produce pain first and weakness and wasting later. And as caries of the spine practically always occurs in the bodies of the vertebræ and not in the laminæ, and as there was no evidence of disease of the spine, the spine was excluded. The question of an exostosis of a lamina was put out of account because it was impossible to conceive that pressure by a hard, rigid body could exist so long and not produce paralysis. The lesion, it was felt, must be soft because of the absence of paralysis, and, secondly, because of the increase of pain when the erect attitude was assumed, owing to the gravitation of blood to the part and consequent engorgement.

Finally, the question to decide was—Is this a lesion of the cord or a lesion of the cauda equina?

A tumour, pressing on the posterior aspect of the spinal cord, must have destroyed the posterior region of the cord before it could have produced weakness and wasting. Moreover, such a tumour must have been a long one to catch all the nerves from the fifth lumbar downwards, and it would have meant abolition of the reflexes and loss of sensation. On the other hand, if the tumour had not extended over the whole region of these roots, but had been situated, say over the fifth lumbar segment, then the reflexes below that segment would have been increased by the lower centres being cut off from those above. For these reasons the cord was excluded, and finally we come to the cauda equina.

Pressure at the level of the fifth lumbar vertebra would catch the fifth lumbar roots and all the roots below that point. It would catch the posterior roots first, and through them the anterior roots. Therefore we arrived at the diagnosis that the



patient was suffering from a tumour in the spinal canal at the level of the fifth lumbar vertebra, that the tumour was on the posterior aspect of the cauda equina, that it was soft and probably non-malignant.

It has been stated that the obturator and quadriceps muscles in both legs were wasted, and that there was absence of knee-jerks, and it might have been concluded that the obturator and anterior crural nerves were also involved in the lesion; but that they were not so involved was evident from the complete absence of the sensory phenomena so conspicuous in connection with the sciatic nerves. How, then, was the atrophied condition of these muscles to be accounted for? The reason is twofold. It will be remembered that for years the boy had been unable to take any form of exercise, and the quadriceps and obturator muscles, like others, had been deprived of their natural stimulus to growth, and the atrophy was in part the result of disuse. The atrophy was also in part due to reflex inhibition of nutrition such as occurs in muscles acting on a diseased joint. In this case the nerves supplying the muscles acting on the hip, knee, and ankle joints, namely, the gluteal, hamstring, and tibial muscles, were abnormally stimulated, and reflexly the opposing nerves and muscles, namely, the obturator and anterior crural nerves and obturators and quadriceps muscles, suffered malnutrition and wasted. It is not essential that nerve irritation should be applied to its physiological terminations, as in joint disease, to produce its baneful effects. The results are the same when the irritation is applied to the trunk of the nerve in any part of its course; the nervous system interprets the stimulation as coming from the normal ending of the nerve, and acts accordingly.

The diagnosis was explained to the friends of the patient, and an operation was advised, to which they readily consented.

Operation.—The operation was undertaken on 3rd September 1907. After the customary preparation, the patient was placed prone on the operating table with the legs hanging over the end and supported at the knees on a suitable rest. A sand-bag was placed under the abdomen so as to diminish the lumbar concavity. An incision was then made in the middle line over the spinous processes of the lower four lumbar vertebræ, and continued over the sacrum for 1½ in. As soon as the subcutaneous tissues were divided, it was observed that below the spine of the fifth lumbar vertebra the tumour tissue was in sight, and, after the spines and laminæ had been removed from below upwards as far as the second, it was found that the lower part of the canal was occupied by tumour tissue extending into the upper part of the sacral canal. There was no evidence of dura mater, and it should be mentioned that the laminæ were unduly thin but not eroded. With the finger the tumour tissue, which was very friable, was gently separated and scooped out, and the component parts of the cauda equina were then exposed lying on the posterior surface of the bodies of the vertebræ spread out and flattened against that surface. Some of the roots were incorporated with the anterior surface of the tumour. The tumour extended upwards on to the body of the fourth lumbar vertebra and downwards into the upper part of the sacral canal for the matter of $\frac{1}{2}$ in., necessitating the opening of that canal. It was now found that the tumour had passed through the fifth lumbar inter-vertebral foramen on the left side towards the left iliac fossa. Here the tumour was followed, was found to be encapsulated, and it was readily scooped out with the finger. After all visible tumour tissue had been removed, it became apparent that the dura mater over the whole of the posterior surface of the tumour had been destroyed—absorbed—by pressure atrophy, and that, having escaped from the dura mater, that it had grown backwards between the laminæ and towards the iliac fossa as already mentioned. There was practically no hæmorrhage. It was impossible to cover in the cauda owing to the destruction of the dura mater, and this it was felt would be a source of trouble afterwards, because of the leaking of cerebro-spinal fluid, and so it proved to be. The spinal muscles were carefully approximated with catgut sutures in layers, and the skin edges finally brought into apposition with the same suture material. A simple dressing was applied, and the patient returned to bed. He was nursed throughout lying on one or other side, but was not allowed to lie on his back, so as to avoid pressure on the wound, which previous experience had shown not to be without danger. The patient bore the operation well, and early stated that the old pain had quite gone. He voided urine naturally from the first, so that a catheter was unnecessary. The wound was dressed on the fourth day, and it was found that the middle of the incision was ballooned out with fluid. Two stitches over this region were removed, and a quantity of cerebro-spinal fluid escaped and continued to flow from the wound, necessitating frequent dressings, which rapidly became soaked. With the escape of cerebro-spinal fluid he began to suffer from intense headache, and the foot of the bed, which had been raised from the first, had to be raised still higher so as to prevent a further diminution of the intracranial pressure. Any attempt to raise the head greatly aggravated the headache. For three weeks the fluid continued to leak from the wound, but after that time the wound closed and the patient was allowed to sit up. A few doses of aspirin and three injections of morphia were all that he received in the way of medicinal treatment. He returned home on the twenty-fifth day after the operation.

The following report on the tumour was received from the Clinical Research Association:—

"The source of this specimen is not mentioned. Its structure resembles that of a fibro-sarcoma such as would arise in connection with the sheaths of a nerve. The tissue is traversed by many vessels and by groups of dilated capillaries. Some of these have ruptured and caused extravasation of blood. Though the degree of malignancy is low, such growths are liable to recur locally."

Since the operation the patient has made slow but steady progress.

He has now normal sensation in the left leg and foot, all the old pain in the back and legs has disappeared, and he is able to walk half a mile without fatigue. His weight at the time of operation was 4 st. 7 lb., and on 10th January last was 4 st. 13 lb., which for his height 5 ft. 4 in. is still lamentably small.

A REVIEW OF RECENT WORK ON SPINAL ANÆSTHESIA.

By J. W. Struthers, F.R.C.S.Ed., *Assistant-Surgeon, Leith Hospital.*

A little more than a year ago the writer reviewed the results obtained in over 2000 cases in which spinal anæsthesia had been used by various surgeons, in order to compare the relative value of general and spinal anæsthesia. The general conclusion reached was that spinal anæsthesia had few, if any, advantages to offer over the use of chloroform or ether, owing to the great uncertainty as to its duration, effects, etc., and the occasional danger attending its use. Since then many surgeons have reported their results, these being almost without exception better than in former reports, and the use of spinal anæsthesia has undoubtedly become more general. It may therefore be well to review some of the more important recent contributions on the subject to allow of a renewed comparison of the value of the various methods of inducing anæsthesia being made.

A general survey of the papers under consideration shows that while most surgeons have obtained improved results, those obtained by Chaput (3) appear to be in every respect the best reported. Chaput states that since he has used his present technique he has obtained with mathematical certainty a complete and profound anæsthesia without reaction in every case. Not only does he claim to obtain these results in the lower limbs and abdomen, but he has also succeeded in producing anæsthesia over the whole body, apparently without danger, and has operated on the upper extremity, the breast, glands in the neck, and parotid tumours under spinal anæsthesia. His technique is as follows:—

An hour before operation $\frac{1}{4}$ mgrm. of scopolamine with morphine is injected subcutaneously. At the operation the eyes and ears are bandaged; 10 to 15 c.c. of cerebro-spinal fluid are withdrawn to prevent subsequent headache, and 0·04 to 0·08 grm. of stova-cocaine without adrenalin are injected, 0·08 grm. being the maximum dose necessary only for a complete anæsthesia, 0·06 grm. being sufficient to produce anæsthesia up to the mammary region. The stova-cocaine consists of 3 parts stovaine to 1 part cocaine in a 2 per cent. isotonic solution prepared by Billon, Paris. This mixture is, according to Chaput, certain in effect, harmless, and much better than stovaine or cocaine alone. The addition of adrenalin he considers not only unnecessary but even harmful. He does not elevate the pelvis to obtain a high anæsthesia, but graduates the dose of stova-cocaine to obtain the desired effect, 0·04 grm. sufficing for the sacral nerve areas and 0·08 grm. for the whole body, except the face and cranial region. If a patient turns pale or the pulse becomes a little weak during the operation, he injects caffeine subcutaneously or elevates the pelvis to remedy the cerebral anæmia. Chaput states that after operation the patients are usually quiet and comfortable. They occasionally suffer from headache on the second or third day, which yields to the withdrawal of 10 to 15 c.c. of cerebro-spinal fluid by lumbar puncture. Without stating the exact number of operations which he has done with this technique, Chaput says that he has used it for two years with entire satisfaction, and that the abdominal operations number over 100, without a single accident, inconvenience, or failure to record.

In view of the less favourable results obtained by others, Chaput's are certainly remarkable and merit careful attention and examination. In the first place, it must be noted that he lays down a number of contra-indications against the use of spinal anæsthesia. It is dangerous, he says, to employ it in subjects with arterio-sclerosis and in the old and feeble, patients over 65 years of age being liable to syncope and apoplexy during or after its use, as with general anæsthesia. Further, in cachectic states, grave anæmias of any kind, serious infective conditions, albuminuria and diabetes, syphilis and diseases of the central nervous system, spinal anæsthesia is contra-indicated. These contra-indications are, however, only relative, for he believes that general anæsthesia is even more dangerous than spinal in the conditions named. It will certainly be astonishing if further experience shows the relative safety of the stova-cocaine mixture Chaput recommends. The use of cocaine alone in doses of 0·015 to 0·02 grm. has been long regarded as dangerous, and apparently with excellent reason, and yet Chaput maintains that the addition of 0·045 to 0·06 grm. of stovaine to these doses renders them safe. One cannot help recalling in this connection that the French school led by Tuffier persisted in the use of cocaine for spinal anæsthesia long after its use had been condemned as unjustifiable on account of the attendant dangers by others. It is a notable admission by an advocate of spinal anæsthesia, that the partial abolition of consciousness by scopolamine and morphine and the bandaging of the eyes and ears, are necessary to obtain the best results. Note must be taken also of the direct contradiction between Chaput's account of the effects of the Trendelenburg position in obviating collapse and of the withdrawal of cerebro-spinal fluid in curing headache, and the accounts of others who maintain that the former is dangerous and likely to induce collapse, and the latter useless in treating the severe headache which often follows spinal anæsthesia.

Further reports of Chaput's work will be awaited with interest. The results he claims to have obtained are certainly remarkable, but judgment must be suspended till further experience of his methods has been accumulated.

Turning to work recently reported from Germany, one finds that the tendency to return to the use of tropacocaine noted over a year ago has become more marked, while adrenalin or its substitutes are being less and less made use of. Bier now uses tropacocaine alone, in 5 per cent. solution in distilled water, diluted for high anæsthesia with 8 to 10 c.c. of cerebro-spinal fluid. Strauss (6) from a thorough review of the whole subject, and from his own experience, concludes that it is the best drug for the majority of cases. Oehler (7), writing from Kümmell's clinic in Hamburg from an experience of 1000 cases in which various drugs were used, declares that tropacocaine is without doubt the least harmful drug at present known. Opinion in favour of tropacocaine is, however, not unanimous, Sonnenburg, for example, still using stovaine, while Füster (4) and others prefer novocaine. In this country Barker (1) favours the use of stovaine, while Leedham Green has obtained good results with tropacocaine.

Tropacocaine is generally used either in 5 per cent. solution in distilled water, or dissolved in cerebro-spinal fluid withdrawn for the purpose. The maximum safe dose is 0·06 grm., *i.e.* just under 1 grain. To obtain a high anæsthesia, the use of a full dose, diluted with 8 to 10 c.c. of cerebro-spinal fluid and moderate elevation of the pelvis immediately after injection, are necessary. In this connection Barker draws attention to the importance of using a solution for injection of higher specific gravity than the cerebro-spinal fluid, which will gravitate to the dorsal region when the pelvis is moderately raised. A 5 per cent. tropacocaine solution in distilled water fulfils this condition, its specific gravity being 1·0106 compared to 1·0070, the specific gravity of the cerebro-spinal fluid. Extreme elevation of the pelvis is by most regarded as likely to bring the anæsthetic into direct contact with nerve roots springing from the medulla, and as therefore dangerous.

No death, so far as the writer is aware, has been reported due to direct toxic action of a moderate dose of tropacocaine. Headache and slight rises of temperature are not uncommon after its use, but are not usually severe and apparently less frequent than after any other drug, excepting Chaput's stovacocaine.

Without going into wearisome detail, it may be said that the results reported from Germany within the last year appear to have improved, though still leaving much to be desired.

Oehler's summary of 146 cases in which tropacocaine was used, may be cited as typical of present-day results. In six cases anæsthesia was quite insufficient; general anæsthesia had to be employed in addition in eight cases; four patients suffered from sickness and vomiting during operation, and five from temporary collapse; eight patients had headache and sacral neuralgia after operation. The average duration of anæsthesia was three-quarters of an hour with a dose of 0·05 to 0·07 grm. Strauss gives the average duration with similar doses as one hour. From these results it will be seen that though untoward complications and after-effects have become distinctly less numerous than in the early days of spinal anæsthesia, they have by no means been abolished. Its use is specially dangerous in severe infective conditions, four cases of death from suppurative meningitis having been published, three from Sonnenburg's clinic and one from Kümmell's, and in three of these four severe infective diseases were present elsewhere when the injection was made. The fourth was a case of operation for hæmorrhoids. Disease of the central nervous system, especially perhaps of the cord, is also regarded by most as a contra-indication against the use of spinal anæsthesia. In the absence of these contra-indications, many now prefer spinal to general anæsthesia for any operation in which the anæsthesia may reasonably be expected to suffice. It must be admitted that its use appears to be free from the occurrence of sudden, totally unexpected deaths which sometimes occur under general anæsthesia. In cases of grave respiratory embarrassment or cardiac weakness where local anæsthesia cannot be used, it probably throws less strain on the patient than the use of chloroform or ether.

For general surgical work, however, the question of the relative merits of spinal and general anæsthesia is still an open one.

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TROPICAL DISEASES: NOTES ON SOME OF THE MORE INTERESTING CASES RECENTLY UNDER TREATMENT IN EDINBURGH.

By Major D. G. Marshall, I.M.S., *Lecturer on Tropical Medicine in the School of Medicine of the Royal Colleges, and to the Medical College for Women, Edinburgh.*

While it is hoped these notes will prove of interest to the tropical practitioner, they are also intended to direct the attention of medical men at home to the fact that, owing to our rapid colonisation of tropical and subtropical countries, there is a steady increase in the number of persons returning from these countries suffering from tropical affections. These persons belong to all classes of society, and therefore it is important that all medical men should be alive to the possibility of meeting with cases of this nature in their practice. It is generally acknowledged that such cases are often unrecognised, and consequently receive inadequate treatment; moreover, in certain affections failure to recognise early cases may not only entail much avoidable suffering, but may, through spreading of the disease, cause serious loss in wages to the industrial population. An example of this is furnished in the occurrence of ankylostomiasis in miners in Germany, France, and Cornwall.

The cases here described furnish proof that the number and variety of tropical affections encountered in Scotland is much greater than is generally supposed.

Malaria.—Cases of this disease are numerous (there were three in one ward in the Royal Infirmary a week ago), the patients, men, women, and children, coming from many different regions, as India, Africa, Malay, West Indies, and Panama. Most of the cases were of the benign tertian type; but two men from Panama suffered from severe attacks of the malignant variety, the blood showing crescents and rings, while another case, from South America, had double infection, malignant and benign.

All the cases were easily diagnosed by blood examination, though in one or two instances this entailed prolonged search, and all, including a boy who developed blackwater fever, recovered under the usual treatment.

Kala azar.—Fortunately, this disease is seldom seen in Europeans at home. A case which ended fatally some three months ago was under careful observation from the earliest appearance of the symptoms—a period of six months—and presented many points of interest. This and another, which also terminated fatally, are, so far as I am aware, the only cases which have been seen in Scotland.

Case.—The patient was a young medical man who had contracted the disease while engaged in research work in the Soudan.

Fever of an irregular type, the earliest symptom, was at first attributed to malaria; but this was negatived by repeated blood examinations. Enteric and Malta fever were excluded by agglutination tests. Cultivation of blood drawn from a vein was also negative.

During the whole course of the disease a four-hourly chart was kept, and a peculiar type of temperature associated with kala azar—a double daily rise—with rapid enlargement of the spleen and a marked leucopœnia (the white cells sometimes being as low as 800 per c.mm.), rendered the diagnosis comparatively easy, though it could not be verified during life, as the patient refused permission for splenic puncture, and repeated examinations failed to show the presence of the Leishman-Donovan body in the peripheral blood. Patton (who has recently successfully worked out the development of the parasite in the bed bug) states that in every case it is possible to arrive at a diagnosis by finding the parasites in the white cells of the peripheral blood, but admits that, owing to the scanty number of these cells in this disease, and the very small proportion of them which contain parasites, a tedious search is often necessary.

The patient showed other signs and symptoms characteristic of the disease: a very irregular temperature curve, the fever sometimes being intermittent, at others remittent in type; the tongue was clean, and the appetite good throughout; death was preceded by diarrhœa. Various remedies were tried, including atoxyl, guaicol, quinine, and methylene-blue. With guaicol and methylene-blue, some improvement in the condition was noted, but it was only temporary.

It was noticed that on several occasions the urine showed a brilliant diazo reaction. At the post-mortem examination the spleen was found to weigh 7½ lb., the liver was somewhat enlarged, and there were numerous ulcerated patches in the large and small intestine. Portions of other organs were preserved, but they have not yet been thoroughly examined.

Minute examination of the spleen showed that the distribution of the parasites was most irregular; in fresh smears taken from certain portions they were fairly numerous, but it was impossible to find them in smears made from other parts of the spleen.

This is a point of great practical importance. It is well known that splenic puncture for diagnostic purposes is occasionally followed by a fatal result, and it is highly probable that in this case, had this procedure been adopted, a portion of the spleen free of parasites might have been explored. Since it has been shown that examination of the peripheral blood is usually conclusive, it would seem that puncture of the spleen is unjustifiable.

It is usually held that kala azar is invariably fatal, but it is reassuring to know that occasionally a perfect recovery has been recorded in Europeans.

Beri-beri.—Since the description in these columns (February 1906) of an infected European crew at Leith, several cases of this disease have come under notice in Europeans and Chinamen. As a rule, they were of Wright's "residual paralytic" type, and rapidly improved under treatment.

Yaws.—Satisfactory results were obtained in a case from the administration of atoxyl combined with local applications of collodium callosum, and gentle scraping with a sharp spoon. After the yaws, which chiefly affected the hands and feet, had healed, the whole body was one day found to be covered with a "coppery" rash, which disappeared in a few days under the administration of mercury and potassium iodide.

After the lapse of some months, no signs of the disease were manifest, and the patient (who, by the way, when he first came under observation, was found to be also suffering from Dhobi's itch) was permitted to return to Africa.

Dysentery and liver abscess.—Cases of amœbic dysentery have been fairly numerous; all recovered except in one instance in which death resulted after formation of liver abscess.

Consideration of the cases of liver abscess which came under observation tend to confirm the opinion that this condition is very common in Europeans returning from tropical countries, and that the diagnosis is often by no means easy. One case had been diagnosed as empyema, another in which the abscess had burst through the lung was on the homeward voyage classed as phthisis; a third in which a small abscess undergoing "natural" cure was found at a laparotomy, had been sent in for operation for gall stones.

The fatal case referred to above presented many points of interest. The amœbæ were readily found in the stools, in the discharge from the abscess from the third day after operation till the death occurred, and in the sputum. After death, sections of the liver and lung showed the parasite not only in the walls of the abscess cavity, but in blood vessels of the liver and in the alveoli, smaller branches of the bronchi and blood vessels of the lung.

Recognition of the amœbæ is more easy in fresh preparations of stools, sputum, or discharges, than in stained specimens. The slide is most easily kept warm by placing a small electric lamp in contact with the stage of the microscope; the movements of the amœbæ can then be followed without difficulty.

For staining temporary films or sections, thionin-blue gives the most satisfactory results, as the amœbæ stain readily and are easily seen, but for permanent preparations iron alum and Heidenhain's hæmatoxylin give good results. Sections stained by this method ten years ago are still clear and show every detail.

Sprue.—Milk diet with phosphate of soda occasionally varied by meat juice gave the best results. In one case, which ended fatally, the muscle changes recently described by Bramwell were well marked.

Ankylostomiasis.—The two men suffering from ankylostomiasis, to whom reference was made in these notes in January 1907, eventually made perfect recoveries, but in one instance the disease was very resistant to treatment—large doses of thymol (40 grs.), given with the usual precautions, had to be administered at intervals for some months before the patient could be declared free of the disease and allowed to resume work as a miner.

In the *Journal of Tropical Medicine*, 1907, November 1, p. 352, Brand describes a simple, but apparently excellent, method for the cultivation of larva.

Bilharziosis.—During the South African war a very large number of our soldiers contracted this disease, and are now, having left the service, scattered all over the country. It is well this should be known, as men suffering from the disease may appear in the most unlikely places, and errors in diagnosis are not improbable.

By the kindness of the senior medical officer at the Castle, I have been enabled to examine many of the men in receipt of invalid pensions who periodically report themselves. On occasion as many as twenty may be seen in one day. As a rule, the men object to enter a civil hospital as long as they are fit for even light work, but several interesting cases have been under treatment. One man developed perinephritic abscess, and later stone in the bladder. In Egypt it has been recorded that in cases of bilharziosis in which death resulted from some acute form of disease as enteric or dysentery, the adult worms were found to be dead, and the use of sera as a curative agent has been suggested In this particular case, whether as a result of the acute suppurative condition or the repeated administration of chloroform for examination and operation, it was found impossible to hatch the ova found in the urine, though this had been easily accomplished in all the other cases, and the man left the hospital apparently cured. Treatment of this disease has hitherto been so uniformly unsuccessful, that in another case a trial was made of atoxyl Some improvement resulted, but the treatment had to be discontinued, as when the dose was increased to 2½ grs. the patient complained of dimness of vision, and was found to be suffering from subconjunctival hæmorrhages. It is intended to make further trial of this mode of treatment.

Among other tropical diseases which came under notice may be mentioned a case in which *Filaria nocturna* (*Microfilaria bancrofti*) was found in the blood, and another with peculiar transitory swelling of the upper extremities (which will probably prove to be a case of infection by *Filaria loa*) in which an eosinophilia of 67 per cent. was noted on one occasion.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

1. *Trypanosomes and Trypanosomiasis.* Laveran and Mesnil. Translated and much enlarged by D. Nabarro. London: Baillière, Tindall, & Cox.
2. *Tropical Medicine.* Jackson. London: Rebman Ltd.
3. *Tropical Diseases.* By Sir Patrick Manson. Fourth Edition. With Seven Coloured Plates and 241 Plain Figures. London: Cassell & Co.

1. The receipt of three new books on tropical diseases within a few days may be accepted as a sign of the rapid progress which is being made in this branch of medicine. All three possess one common characteristic in being a credit to their respective publishers; the letterpress and reproduction of illustrations leave nothing to be desired, while Nabarro's translation and the fourth edition of Manson's book are thoroughly up-to-date, in this respect comparing very favourably with some recent publications on the same class of subject.

"Trypanosomes and Trypanosomiasis," the largest volume of the three, is entitled to prior consideration. It is not merely a translation of Laveran and Mesnil's well-known work (published three years ago), for, owing to the vast amount of original work which has been undertaken on trypanosome infection during the last three years, it has been found necessary, in order to bring the book up to date, to insert an amount of new matter (carefully distinguished by boundary marks) which has increased the size of the volume by nearly one-half. Among the more important additions may be mentioned articles on the "Spirochætes," "The Leishman-Donovan Body," "Recent Observations on the Occurrence of Flagellates in the Tsetse Fly, Mosquito, Leeches, etc.," and illustrated descriptions of many new trypanosomes of small mammals, birds, batrachians, and fishes.

After chapters on the "Technique for the Study of Trypanosomes," in which staining methods, cultivation, and inoculation experiments are described with great accuracy and detail, animal diseases, as "Nagarna," "Dourine," "Surra," etc., associated with the presence of trypanosomes, are exhaustively considered.

These diseases have been the cause of so much monetary loss both to communities and nations, that this portion of the book, while it will chiefly interest the scientific veterinarian, may from the economic standpoint be recommended for perusal to the government officials to whom the administration of the regions in which the diseases are prevalent is entrusted.

As might be expected, a large amount of space is devoted to

"Human Trypanosomiasis," including sleeping sickness; in addition to much original matter by the translator, copious references being made to the latest literature on the subject.

When Laveran and Mesnil's work was published in 1904, little or nothing was known regarding the treatment of trypanosomiasis. Since that time a large number of investigators, notably in this country and in France, have been engaged in the effort to discover a cure for the disease, and the results of so much original work, experimental and clinical, have been published, that it has been found necessary to add a new chapter, complete in itself, in which all the most recent methods of treatment are very fully and ably described.

The remainder of the book is occupied with the most complete description of the trypanosomes of birds, reptiles, batrachians, and fishes which has hitherto appeared in any work, all the latest additions to our knowledge of this most interesting branch of the subject being described in great detail, with numerous illustrations.

Typographical errors are few and unimportant, "1920" on p. 5 being too obvious to be misleading. The section on "Spirochætes," considering the importance these organisms are now assuming, is sketchy, Castellani's discovery of a spirochæte in yaws being disposed of in two lines. We have always understood that the discovery of the relation of trypanosomes to sleeping sickness was made by Castellani in 1902, the researches of Bruce, Greig, and Nabarro in 1903 confirming this discovery, and that Greig in his communication to the Royal Society, received and read on May 5, 1904, first pointed out the easy method of diagnosing trypanosomiasis by puncture of a lymphatic gland.

Beyond these few criticisms, we have nothing but praise for the book. Nabarro is to be congratulated not only on the accuracy of his translation, but on the painstaking work by which he has been able to collect all the latest literature on the subject and produce a work which, containing as it does all that is at present known of trypanosomes, not only provides most interesting reading, but will prove a valuable book of reference to all engaged in the study of trypanosomiasis, whether in connection with disease or otherwise.

2. The second work ("Tropical Medicine," Jackson) calls for but brief notice. Its scope is very limited, since it treats chiefly of the tropical ailments prevalent in the West Indies, Central America, and the Philippines. The author candidly states in the introduction that for the sake of utility he has "omitted from consideration, other than simple mention or reference, a number of tropical diseases which have not been observed or occur so rarely as to be almost never encountered by the army, navy, or marine hospital surgeon, or by the civil medical observer in the American tropics."

As a result of this, some important diseases prevalent in other tropical countries receive only the scantiest reference, while others are left quite unmentioned.

Unfortunately the book, although so recently published, is not up to date: for instance, there is no mention of the use of atoxyl in the treatment of sleeping sickness, or of the presence of the *Spirochæta* *pertenuis* in yaws, while it is evident that the author has not read the reports of the Commission on Malta Fever, for it is stated that "the method of its transmission is entirely unsettled, and hence prophylactic efforts cannot be very specific." On the other hand, some very original opinions are expressed on many points (such as the value of ipecacuanha in the treatment of dysentery and the non-existence of sprue as a distinct disease), which are totally at variance with the opinions held by those whose field for the study of tropical diseases has not been limited to America.

The book, which would have been more aptly designated by the term "Diseases of the American Tropics" employed on the first page, is written in a clear, concise style, and will probably find a ready sale in America, but we regret that for the reasons above stated we are unable to recommend it to the student or practitioner desirous of possessing a general knowledge of tropical diseases.

3. Manson's "Tropical Diseases" is so well known and appreciated, that many have been looking forward to the issue of the fourth edition in the expectation that it would, as usual, prove to be a reliable, up-to-date text-book on the subject, and in this they will not be disappointed.

The book has been increased in size by more than a hundred pages, of which fifty are occupied by a new and valuable appendix on the "Protozoa of the Blood of Vertebrates." Several excellent plates have been added, and there are many new illustrations, while by skilful revision it embodies in a concise form practically all the latest and most important additions to our knowledge of tropical diseases.

Although the general excellence of the work cannot be denied, it presents a few features which suggest themselves as capable of improvement.

The description of the malarial parasites, while very exhaustive, would be rendered more easily comprehensible by the addition of a coloured plate showing the different forms of the parasite. To take one example: the sexual form found in the peripheral blood in benign infections is described as "closely resembling the mature parasite just prior to segmentation," and the reader is referred to an illustration which is devoid of any distinctive features. We are quite certain that, although this form of the parasite presents a most characteristic appearance in stained specimens, not one student in a hundred would be able to recognise it from the illustration or the description above quoted.

Enteric fever is the cause of so many deaths both of Europeans and natives in tropical countries, that the four pages devoted to the consideration of this disease are quite inadequate. No reference is made to scurvy, though every tropical practitioner knows how frequently this condition is encountered in the tropical and subtropical countries, and that it is a potent factor, often unrecognised, in the want of success in the treatment of both medical and surgical cases. Lathyrism, which, as Handley has shown, causes annually a large mortality in India, and possesses some features in common with beri-beri, is another disease which is left unnoticed.

On the other hand, we note a tendency to encourage the practice, too often indulged in by writers on tropical diseases, of rushing into print and making definite assertions on insufficient data; there have been numerous instances of this during the last five years, in many cases the work of other investigators proving such assertions to be incorrect.

"Seven days' fever of Indian posts," which recent investigations have shown is nothing more or less than a form of dengue (an opinion long held by practitioners in India), is one example of this, while several others will be found in this book by consideration of the various theories and "strong assertions" of Sambon on many subjects, including the etiology of spotted fever of the Rocky Mountains, siriasis, and blackwater fever, the rôle played by the tsetse fly in the propagation of trypanosomiasis, etc. Most of the views put forward by Sambon are purely theoretical, unsupported by the slightest evidence of proof. Even in the matter of the new species of parasite *Schistosomum Mansoni*, the examination of two worms which he admits were too badly preserved to permit of any study of comparative anatomy, is the sole evidence adduced to support this addition to our already overladen nomenclature. Regarding *siriasis*, since Sambon has during the last four years been apparently unable to bring forward anything in support of his theory, we may conclude that the following caustic criticism applied by MacLeod is still applicable: "The presence of a specific germ is pure hypothesis, and the attempts to prove it an epidemic disease, limited to a certain degree of altitude, are equally absurd."

There is nothing perfect under heaven, but Sir Patrick Manson's book is as near perfection as possible, and until further editions appear the present one will be regarded as the standard work on the diseases of tropical and subtropical climates. We can thoroughly recommend it to all engaged in the study or practice of tropical medicine.

The Treatment of Disease. By Reynold W. Wilcox. London: Rebman Ltd.

The second title of this work, "A Manual of Practical Medicine," is the more appropriate, for, while the author does not venture far into the realm of theory, he discusses more or less fully the pathology and symptomatology of every disease. The book is clearly written, and its contents sound and orthodox. Treatment is advised on what are in the main already well-established lines, and although throughout the volume we feel that the author speaks of methods which he has tried and tested by his own wide clinical experience, there is but little in the work which will be new to the profession.

The classification follows ordinary lines, beginning with infectious diseases and ending with animal parasites. The author believes that milk remains the most perfect food in enteric fever, and deprecates the continued popularity in his own country of the cold-bath treatment. He considers that in every case urotropin should be administered as a means of safeguarding the public health. On p. 17 calomel as an intestinal antiseptic is said to be "practically inert," on p. 59 its use in cholera is said to be attended with good results, not only in controlling the vomiting, but because it has in addition an antiseptic action upon the digestive tract. Excellent rules are laid down for the dosage of antitoxin in diphtheria, and the author emphasises the danger of heart failure in this disease. Gummata are held to be infectious, and yet the prohibition against marriage is only two years after the primary sore, or, if active symptoms remain, then "as long as these persist."

Creasote carbonate, in the author's experience, given in doses of ½ drm. to 1 drm., cuts short or aborts a large percentage of cases of croupous pneumonia, and mitigates almost all the rest. Disease of the islands of Langerhans is said to be the cause of the pancreatic type of diabetes mellitus, and Charcot's joints to occur in rheumatoid arthritis.

On the medical treatment of gastric ulcer the author is an enthusiast, and declares that 95 per cent. of cases should terminate in recovery in from twelve to fourteen days. In appendicitis, constipation may be allowed to last for five or seven days. It is justifiable to attempt reduction of an intussusception by inflation or the injection of fluid, but "unfortunately a recurrence of the intussusception not infrequently takes place."

An admirable account is given of the indications and contra-indications for digitalis in heart disease. In cardiac cases paraldehyde is the best hypnotic, but the dose recommended—½ drm.—seems too small.

A much needed warning is given against the indiscriminate use of combustible powders by asthmatics. Like many other observers, the author has found creasote vapour yield excellent results in bronchiectasis.

Dr. Wilcox has made a special study of dechloridation in chronic parenchymatous nephritis, and finds restriction of salt from the food of great value in the prevention and treatment of dropsical conditions generally.

Syphilis in the Army. By Major H. C. French. London:
John Bale, Sons, & Danielsson.

This monograph deals chiefly with the disease as it occurs among our troops in India. The author has for long been an advocate of preventive measures, and from statistical evidence he shows the great diminution in venereal diseases that has resulted from controlling diseased women under the Cantonment Act of 1897. The admission ratio fell from 536 per 1000 in 1895 to 200·3 per 1000 in 1904, the diminution commencing immediately after the control code came into force. The methods of control adopted in Indian cantonments, for which the author is to a large extent responsible, are fully detailed in the second section of the work; and numerous appendices are furnished, which go to show the efficacy of these precautionary measures.

The section dealing with treatment is particularly interesting. The author appears to us to take an eminently moderate and rational view of the rôle of mercury in the treatment of syphilis. While he fully and freely admits its value, he is in no way blind to its dangers and limitations. He utters a timely warning against pushing the drug to its full physiological limits. "Many of the so-called relapses," he says, "are cases of secondary ulcers in the mouth, aggravated by mercurial stomatitis." "I have seen men broken down by mercury as well as by syphilis." Major French places more reliance on potassium iodide in the early stages of the disease than most syphilographers, and he advocates its more frequent employment, both alone and in association with mercury. With regard to the influence of drugs on the disease, however, he believes that they merely remove the external manifestations, and thus assist the natural process of cure; but it is doubtful if they do more. "Syphilis is essentially a disease where we treat symptoms, and at the same time lay the flattering unction to our souls that we are treating the cause. Whether nature or our remedies take the larger share in obtaining success is immaterial; progress is the ultimate object of both."

The Surgical Treatment of Chronic Suppuration of the Middle Ear and Mastoid. By SEYMOUR OPPENHEIMER, M.D. New York and London: Rebman Ltd.

WE do not think we are wrong in saying that, at the present time, the smaller the subject selected, the larger appears to be the volume necessary for its description. As the title of this book indicates, it is limited to a discussion of the surgical treatment of chronic suppuration of the middle ear, nevertheless 410 large pages are required in order to place the subject before the reader. It must not be forgotten, too, that the intracranial complications of middle ear suppuration are not dealt with. It necessarily follows that the author tends to be somewhat diffuse in places, and his descriptions might with advantage have been curtailed. At the same time a great deal of valuable information is to be derived from reading these chapters, and the illustrations, which are numerous, are very beautiful and of great practical value.

The volume is divided into two parts. In the first, the treatment of chronic middle ear suppuration by way of the external auditory meatus is considered, a special chapter being devoted to the removal of the ossicles. Sufficient emphasis is not laid upon the value of Neumann's method of obtaining local anæsthesia by subcutaneous injection into the postero-superior wall of the meatus. Indeed, the information furnished regarding local anæsthesia and hæmostasis, so important an element in operations in this situation, is very meagre and not likely to prove of great value to surgeons. The second part deals with the mastoid operations, the after-treatment of these cases, and the various plastic methods of closing a retro-auricular opening. A volume of this kind will prove of more value as a work of reference than as a text-book for everyday use, and in its former capacity it will appeal to the specialist in ear diseases. We notice the use of such words as "cauterants" and "atticitis," which we are not inclined to favourably accept.

A Text-Book of the Diseases of the Ear, Nose, and Pharynx. By D. B. ST. JOHN ROOSA, M.D., LL.D., and BEAMAN DOUGLASS, M.D. New York: The Macmillan Co.

THIS volume, which was originally the work of Dr. St. John Roosa, has been practically re-written and brought up to modern ideas of teaching and practice by the collaborators. It makes a very readable text-book, and is full of useful information. There is a tendency at the present time for writers of books upon diseases of the ear to become too diffuse, and a good deal of what is really of practical value to the reader is lost in the mass of detail. This criticism cannot be applied to the authors of this volume. It is true that certain simple methods of treatment are given in considerable detail, but we are at one with the authors on this point, as it is so frequently necessary that the medical attendant should be able to instruct patients exactly as to how such and such a procedure is to be carried out. Dr. Roosa is one of the pioneers in otology in the United States, and we are glad to see that his work is still brought prominently under the notice of the profession.

The Eye, Ear, Nose, and Throat: The Practical Medicine Series. Vol. III. Series 1906. Edited by C. A. Wood, A. H. Andrews, and G. P. Head. Glasgow: Gillies.

This volume forms one of a series of ten volumes comprising a review of the year's progress in medicine and surgery. At the present time scientific literature is so enormous that access to it and time for its perusal cannot be procured by many who are anxious to keep themselves abreast with what is new. "The Practical Medicine Series" is an American publication, which endeavours to deal in brief with the chief papers published each year in the different departments of medicine and surgery. For one who is content to accept a synopsis of another's work, or who cannot procure the original paper, this volume will prove of value, as it gives a brief résumé of many interesting papers in connection with affections of the eye, ear, nose, and throat. The names of the writers associated with the volume sufficiently guarantee the character of the work.

Polypus of the Nose. By Eugene S. Yonge, M.D. (Edin.), Honorary Assistant Physician, Manchester Hospital for Consumption and Diseases of the Throat. Manchester: Sherratt & Hughes.

The etiology of nasal polypus has long baffled the surgeon, and various are the views which have been expressed regarding the causation of this troublesome nasal affection. Dr. Yonge has devoted a great deal of time and care in the elucidation of this subject, and in the present volume he gives a synopsis of the various views which have been expressed regarding the origin of nasal polypi, and then details his own work in connection with it. We must confess that he fails to impress us with his conclusions. Briefly, his theory is that polypi are œdematous hypertrophies of the nasal mucous membrane, the indirect result of certain mechanical changes in the mucous glands. To prove his point he has carried out experiments on cats. It would be outside the scope of such a review as this to detail the experiments and the conclusions drawn from them. To all, however, who are interested in the subject, we recommend a careful perusal of the author's work, and we congratulate him on his untiring energy in seeking to elucidate the cause of this common and troublesome affection.

Diseases of the Larynx. By Harold Barwell, M.B. (Lond.), F.R.C.S. (Eng.), Surgeon for Diseases of the Throat, St. George's Hospital. London, etc.: Henry Frowde, Oxford University Press.

This volume is one of the series of "Oxford Medical Publications" which are now appearing, and it has been specially written to supply what has certainly been regarded as a want, namely, a small manual dealing with affections of the larynx. We congratulate Mr. Barwell on supplying this want, and can recommend his work to the notice of the profession. It contains a great deal of useful matter, and the text is not overburdened with unnecessary detail. The chapter on tuberculosis of the larynx is very good and is well illustrated. This was to be expected from the author's previous work on this subject. The book is certain to be of value to the student and practitioner.

Hay Fever, Hay Asthma: its Causes, Diagnosis, and Treatment. By William Lloyd, Surgeon in Charge of the Nose, Ear, and Throat Department, Kensington General Hospital, etc. London: Henry J. Glaisher.

The author of this small volume makes no pretence of bringing before the profession any really new data regarding the etiology and treatment of hay fever. As he states in his preface, his chief reason for writing it is to record certain opinions which he holds upon the causes and effective treatment of this troublesome affection. He subdivides the subjects of hay fever into two distinct clinical types: those in which no structural abnormality is found in the nose, certain hyper-sensitive areas alone being detected, and those in which there is some structural abnormality in addition to the hyper-sensitive areas. Like the author, we are inclined to regard the first group as forming the true type of hay fever, and in our experience the majority of cases are of this nature. In treatment he lays stress upon the value of the cautery, and in his hands it appears to have met with considerable success. The volume gives a very fair résumé of the subject.

Atlas and Epitome of Diseases of Children. By Dr. R. Hecker and Dr. J. Trumpp. Philadelphia and London: W. B. Saunders Company.

This "Epitome of Diseases of Children" (one of Saunders' "Hand Atlases") is an American translation of the work of Drs. Hecker and Trumpp, of the University of Munich, who, in the preface, advance the opinion that a subject can be nearly as efficiently taught by pictorial representation as by clinical instruction. With this end in view, they have interspersed the pages of this treatise with an unusually copious supply of coloured plates and black-and-white illustrations, most of which are excellently reproduced and faithfully depict the conditions they represent. Unfortunately, perusal of the book does not fulfil the expectations which the high standard of the illustrations leads one to anticipate. The clinical descriptions of the various conditions are often most inadequate, the definitions are exceedingly cumbrous, many important diseases of children are altogether omitted, and the rules laid down for treatment are superficial and frequently misleading. Not to labour the question, dyspepsia is defined as "a result of injurious effects upon alimentation or disturbance of digestion and absorption due to organic weakness," no reference whatever is made to the rheumatic state in childhood, congenital laryngeal stridor and other important diseases of children, and the treatment of pyloric stenosis is summed up in the giving of high enemata, cataplasms to the abdomen, and atropin internally and subcutaneously. The nomenclature adopted is unusual, and we are treated to such unfamiliar terms as pedatrophia for atrophy, folliculus abscedens for multiple abscesses, balanoposthitis for balanitis, and many other unpronounceable names.

Nor can the editor be congratulated on his translation, which shows signs of hasty work. The sentences are frequently so involved as to obscure the meaning of the passage, the text bristles with literary inelegancies and with American crudities of expression and spelling, which will not appeal to British readers.

Apart from the illustrations, the book does not add anything to the literature of diseases of children, and it is not likely to supplant any of the excellent text-books on the subject.

Diseases of the Intestines and Peritoneum. By Professor Dr. HERMANN NOTHNAGEL. Edited, with additions, by H. D. ROLLESTON, M.D. Second Edition. Authorised translation under the editorial supervision of ALFRED STENGEL, M.D. Philadelphia and London: W. B. Saunders Company.

THIS very large volume—it contains over a thousand closely printed pages—is probably the most encyclopædic description of intestinal and peritoneal diseases extant. The late Professor Nothnagel was a voluminous writer, and his name, moreover, is specially associated with observations on many of the diseases treated of in this work, so that it necessarily has particular and personal value. The introductory chapters contain a very full description of the chemistry, bacteriology, and physiology of the intestine, and have, like the rest of the treatise, been brought thoroughly up to date by copious editorial addenda. Nothnagel attaches more importance to intestinal auto-intoxication, and to Bouchard's views, than do the majority of German clinicians. There is an elaborate description of habitual constipation, which is usually, in Nothnagel's opinion, due to some breakdown in the nervous mechanism regulating defæcation. The account of muco-membranous colitis and of colic are particularly good. In the chapter on diarrhœa, the form due to gastric achylia is briefly dealt with. As a practical point in treatment, which is seldom mentioned in text-books, we may note the advice that when opium has been used to cure diarrhœa the ensuing constipation should be left to nature, and not corrected by aperients. Chronic intestinal obstruction commands a large share of notice, and there is an excellent series of plates showing various forms of "ladder patterns" caused by the peristalsis of dilated and hypertrophied bowel. Looking at our own experience, we should say that these visible contractions of the intestine are less constantly associated with pain than might be gathered from Nothnagel's description. A physical sign discovered by the author deserves quotation in connection with the diagnosis of the seat of the obstruction. It depends on the fact that great distension of the colon causes the percussion note in the lumbar region to change from dull to clear. When the stricture is in the sigmoid flexure both lumbar regions become resonant; when it is in the transverse colon or splenic flexure, only the right side becomes resonant. In obstruction and other acute intestinal diseases, Nothnagel advocates a more liberal use of opium than is generally recommended in this country, though he admits that his practice has recently undergone a change in the direction of restricting the drug. He lays down the rule that in obstruction of the bowels it should be given only within the first twenty-four or thirty-six hours, when pain is violent, and when a positive diagnosis cannot be made. A page is devoted to the use of metallic mercury in obstruction, the conclusion being that it is "hardly justifiable." There is a good study of appendicitis, in the treatment of which opium is strongly recommended. The objection that the drug masks symptoms is held as unimportant in comparison with its actual value. The section dealing with tuberculous peritonitis is not wholly in accord with modern views, particularly as to the age incidence of the disease, and the rarity of intestinal ulceration. This is partly due to the fact that here, as in other parts of the book, reference is made almost exclusively to adult patients: the numerous and important diseases of the bowels in children are scarcely mentioned. It is impossible, however, to touch on the innumerable subjects which this treatise discusses; it is in all respects a veritable mine of information.

To criticise, at this time of day, Nothnagel's "Handbuch" is to adopt the attitude of him who finds Shakespeare dull; there are many excellent people in the latter position, and they are neither inordinately presumptuous, nor, indeed, anything but modest persons in other particulars—a reflection which must serve as the present reviewer's apology when he expresses the opinion that this book would have been much better had it been half the size. Even as an encyclopædia, it is too thoroughgoing for ordinary mortals. Medicine is a big enough subject nowadays, and some limit should be set to the discussion of theories which, if not obsolete, are at least obsolescent, were it only that when the writer is a master of his subject we wish to discover his conclusions without too much hunting in a jungle of conflicting hypotheses. The desire to set down all the views which have been held on questions in themselves very complicated cannot be yielded to without greatly lengthening a book, and it may be doubted whether its value is correspondingly enhanced. Add to this, that disease is classified and subdivided, and clinical types are multiplied to an inordinate extent, so that often just as the reader thinks he has reached an end, he finds the author breaking into a fresh disquisition on a new variety. Every symptom is minutely analysed, not merely as to significance, but as to the cause and the theories which have been proposed to account for it, while the editor has been equally painstaking in garnering every fragment of literature which bears on the question in hand. For all these reasons, the volume is prolix, and contains many digressions and repetitions, rendering it difficult and not always interesting reading.

This, however, must remain largely a matter of personal taste, and we willingly admit that the flaws we have ventured to point to in this book exist only by reason of its virtues; without them it could scarcely have achieved the position of being the most elaborate treatise in existence on peritoneal and intestinal disease.

"*Le Ventre*": *Étude anatomique et clinique de la cavité abdominale au point de vue de massage.* Par Dr. F. Cautru et Dr. M. Bourcart. Vol. II. Paris: Felix Alcan.

In this volume the authors describe the topography and physiology of the organs of digestion as an introduction to their advocacy of massage in the treatment of various gastric and intestinal disorders. They claim to have obtained seemingly wonderful results in treating constipation, diarrhœa, muco-membranous enteritis, certain forms of ileus, etc., and are even bold enough to use massage in the early stages of acute appendicitis, in the hope of cutting short the attack. They favour exclusively manual as opposed to instrumental massage. While the frankness with which Drs. Cautru and Bourcart state their results and describe their methods is worthy of praise, we doubt if their book will cause many to share the profound faith they have in the manifold powers of their favourite therapeutic agent. They claim too mnch.

The Opsonic Method of Treatment. By R. W. Allen, M.B., B.S., Pathologist to the Royal Eye Hospital. London: H. K. Lewis.

The clear and succinct account of the opsonic method of treatment which Mr. Allen has given in his book will be welcomed more especially by the large section of the medical profession, which must perforce obtain its knowledge of the mysteries of the opsonic index at second-hand. Taken as a whole, the book presents an admirable survey of the subject, dealing briefly with the theoretical aspects of the question, and more fully with the methods and results of vaccine treatment controlled by estimation of the opsonic index, in clinical work. Following the initial chapters on laboratory methods and technique, tuberculous, staphylococcal, gonococcal, and various other infective conditions are dealt with in turn, and striking evidence is brought forward of the value of properly directed opsonic treatment in a number of diseases. Not the least attractive part of Mr. Allen's work is the brevity and clearness of his descriptions. We heartily commend his book to all interested in the subject.

Morris's Treatise on Anatomy. Fourth Edition. By English and American Authors. London: J. & A. Churchhill.

In an introductory note the publishers state that the entire work has undergone a complete revision, which has been effected by placing it in the hands of an American editor, and by securing the services of

American anatomists in the revision or re-writing of several of the sections. The new editor is Professor Playfair M'Murrich of the University of Michigan, and he has specially taken in hand the chapters on "Morpho-Genesis" and on the "Urinary and Generative Organs." Professor Thomson of King's College, London, has revised the articles on "Osteology"; Professor Bardeen of Wisconsin, that on "Muscles"; Florence R. Sabin, Associate-Professor of Anatomy to the Johns Hopkins University, that on the "Heart, Blood Vessels, and Lymphatics"; Dr. Hardisty of the University of California, that on the "Nervous System"; Professor Carl Huber of the University of Michigan, that on the "Organs of Digestion"; Professor Terry of the University of Washington, on the "Organs of Respiration"; Professor Kerr of the Cornell University, that on the "Skin and Mammary Glands"; and, lastly, the section on "Surgical and Topographical Anatomy" is from the pen of Mr. Jacobson, Consulting Surgeon to Guy's Hospital.

A notable innovation is the use throughout the volume of the nomenclature adopted by the German Anatomical Society, and generally known as the Basel Nomenclature or B.N.A. It is stated that, in employing this nomenclature, the editors have been guided by a desire to assist in the unification of anatomical terminology, and we may say that we cordially agree with this laudable ambition. It is certainly confusing for anyone who has studied in this country to find, on consulting works by foreign or American authors, that the terms used are not the same. An important step in this direction was taken by Professor Barker of the Johns Hopkins University, who adopted the new nomenclature in his English translation of Spalteholz's "Atlas of Human Anatomy," published some little time ago. It must be conceded that the present generation will suffer some inconvenience from a partially duplicated nomenclature; but this will disappear in due course, and should not be regarded as a bar to such an important advance.

In other respects there are evidences throughout the whole work of the thorough revision which it has received, and the illustrations have been greatly improved by omitting some from previous editions and adding a large number of new ones both from original sources and from other anatomical publications.

The section on "Surgical and Topographical Anatomy" is very much fuller than that included in other anatomical works; it extends to no less than 142 pages, and is profusely illustrated.

RECENT ADVANCES IN MEDICAL SCIENCE

MEDICINE.

UNDER THE CHARGE OF
J. S. FOWLER, M.D., F.R.C.P.Ed.,
PHYSICIAN, ROYAL HOSPITAL FOR SICK CHILDREN.

Diseases of the Heart.

The heart reflex which is now known after its discoverer as "Abrams' heart reflex" (*Med. Rec.*, N.Y., 1907, December 14) was originally described by him in 1898. It consists in a contraction of the myocardium of varying duration, which results when the skin of the præcordial region is irritated, as by an ether spray, or by scratching, or percussion. The reflex is best observed on the fluorescent screen, as a diminution in the size of the heart shadow, which is usually more evident in the left than in the right ventricle. The degree of myocardial recession varies greatly; in some persons it is barely perceptible, while in other individuals the outline of the heart may come in more than 2 cms. on either side at the first application of an irritant. The reflex is more marked and of longer duration in the dilated than in the normal heart. Subsequent investigations have shown Abrams that the "heart reflex" can be excited by irritation of the nasal, the gastric, the rectal, and the œsophageal mucous membranes, by percussion of the muscles, by psychic stimuli, and by vertebral concussion, as well as by præcordial irritation. If the mucous membranes are rendered insensitive by cocaine, the reflex is abolished. The most marked reflex recession of the myocardium is caused by the psychic stimulus of fright.

Practical value of the heart reflex.—It must be taken into consideration in percussion of the heart. Even the lightest percussion causes enough cutaneous irritation to evoke the "lung reflex of dilation." [This is a temporary dilatation and hyper-resonance yielding property of the lungs, which obliterates the superficial splenic, cardiac, and hepatic dulness.] Cabot and Sahli are quoted as authorities for the statement that after repeatedly percussing the area of superficial cardiac dulness, as in demonstrating to students, the dull area becomes less, and the difference in the note less obvious to the later than the earlier listeners. This lung reflex therefore conceals the diminished cardiac outline which is caused by strong percussion. The carbonic acid baths of the Schott treatment present no special advantages beyond evoking the cardiac reflex, and any form of cutaneous friction would be as efficacious as they are.

Heart reflex in relation to angina pectoris.—The most reasonable theory of angina is that, in consequence of a transient ischæmia of the heart muscle, caused by disease or spasm of the coronary arteries, a condition analogous to intermittent claudication ensues. Abrams' view is that ischæmia takes place, independently of any active participation of the coronary arteries, in consequence of their passive compression from increased tonicity of the cardiac muscle. When the reflex is in evidence, the coronary arteries are subjected to varying degrees of pressure. The factors which are known to precipitate an attack of angina are equally effective in producing the cardiac reflex. In support of the view that the occurrence of this reflex is an essential factor in causing angina, Abrams points out that when cardiac dilatation and failure supervene, anginoid pain is often permanently relieved (Broadbent and others); in dilatation, the enfeebled cardiac muscle exerts less pressure than normal on the coronary vessels. "False" angina is explained on similar grounds.

The "Scarlet Fever Heart" (*Myocarditis scarlatinosa*).—Under this title Pospischill, one of the chief authorities in Vienna on infectious diseases, contributes (*Wien. klin. Wchnschr.*, 1907, September 12) a long paper dealing largely with the varying symptomatology of different epidemics of this fever, but particularly with a curious condition of the heart which at times occurs, and which is so characteristic as to be of diagnostic importance. His attention was first drawn to it in 1903, when four children of one family were all admitted simultaneously to his ward suffering from commencing scarlet fever, and all had in addition signs of endocarditis—cardiac enlargement, arrhythmia, and apical systolic murmur. He naturally supposed that this was a case of family proclivity to cardiac disease, and the diagnosis of endocarditis was confirmed by the persistence of the bruits in three of the children, and of the arrhythmia in the fourth, throughout their residence in hospital. He was soon, however, disabused of the idea that the endocarditis was a family peculiarity by the number of cases during the same epidemic in which he detected what was to him a novel cardiac lesion. The cases cropped up at short intervals for seven months, and then suddenly stopped. Despite careful watch, no further cases of cardiac disease at the onset of scarlatina have been discovered between then and now, until quite recently they have again begun to appear. Clinically there is often found a blowing apical or pulmonary systolic bruit, an accentuated pulmonary second sound, and arrhythmia. What is more characteristic, however, is a reduplication of the first sound with a rough grating murmur, loudest near the third costal cartilage, and audible over the whole sternum; in well-marked cases it is the same as what is heard in pericarditis. These signs generally occur at the onset of the illness, and usually last but a few days; they are very apt to recur during any febrile complication of the convalescence. They seldom develop for the first time in the later stages of scarlet fever. The benign course and absence of effusion led

Pospischill to doubt whether all these cases were really pericarditis; in two out of his three autopsies the pericardium was smooth; in the third there was inflammation. He apparently regards the condition as a myocarditis extending to the pericardial surface (*bis ans Perikard heranreichende Erkrankung*). The most striking clinical feature is the rough murmur and the split first sound; a systolic bruit may precede or be superadded to these. Pospischill gives examples of cases in which the diagnosis was founded on these signs. He was called to see a boy who, beyond appearing ill and showing sign of *scharlach-herz*, had no other symptoms. Scarlet fever was diagnosed, and subsequently the patient desquamated. In other cases he found the same signs on patients in chickenpox and diphtheria wards, and the discovery was generally the herald of an outbreak of scarlet fever among the neighbouring patients. Pospischill notes that among others Litten and Ashby have recorded such cases, without, however, realising their full significance.

Position of the heart in pericardial effusions.—Calvert (*Johns Hopkins Hosp. Bull.*, Baltimore, 1907, October), considering the position of the heart of importance in relation to tapping the sac, has studied the question in formalin hardened sections of the cadavera of two patients dying with pericardial effusions. Skoda and his followers thought that the heart was driven downwards and backwards; Schaposchnikoff and others say that it is pushed forwards and upwards, and may be in contact with the chest wall in front; while a third opinion is that it retains its normal position. In Calvert's first case the heart and vessels were collapsed, and the heart lay against the posterior wall of the pericardium; while in the second case the heart and vessels were distended, and occupied a relatively normal position. He compares his own sections with three others which have been published; all go to show that when the heart is displaced from the normal position it is driven back, not forwards. The position depends on the state of distension of the chambers of the heart. A study of the circulatory changes in the light of physiological and clinical data leads to these conclusions—(1) The position of the heart in pericarditis depends on the size of the heart. (2) The size of the heart depends on its distension, or the amount of blood it contains. (3) The amount of blood depends on the stage of compensation. (4) While compensation is maintained, the heart contains a relatively normal amount of blood, and is in a relatively normal position. (5) When compensation fails, the amount of blood delivered to the heart is diminished, the heart becomes smaller and smaller until collapsed. During this change the heart successively occupies positions varying from normal to close against the posterior wall of the pericardium. (6) The apex is in a normal position or displaced backward and slightly to the right; otherwise unchanged. (7) When the pericardial pressure is high, or when compensation is failing, the signs should be—triangular area of dulness, high pulse rate, perhaps pulsus paradoxus, low arterial tension, marked systemic venous congestion, and pronounced pulmonary symptoms.

The Transmissibility of Diabetes between Married People.

In a paper on "Conjugal Diabetes" (*Berl. klin. Wchnschr.*, 1908, January 27) Professor Senator refers to the greatly increased prevalence of the disease in late years, and states that according to statistics collected by Schmitz (2320 cases), Oppler and Kulz (2069 cases), and himself (770 personal observations), the percentage of cases of diabetes in husband and wife works out at from 1 to 1·5 per cent. Others have got a very similar percentage. Senator points out, however, that these figures do not give a true idea of the real frequency of conjugal diabetes, because they include both married and unmarried persons. He has therefore analysed his own cases afresh, to see whether they support the idea that the disease is communicable.

Total number of diabetic marriages and cases of conjugal diabetes.—Of 516 married couples in which one partner had diabetes, the other was also diabetic in twenty-two instances. Excluding three cases in which both patients took ill simultaneously, or at very short intervals, we have nineteen, or 3·7 per cent. The duration of married life in these nineteen cases was between 23 and 42 years, and the interval between the illness of the two parties was from 1 to 15¾ years.

Total number of diabetic marriages, minus those in which the marriage existed for less than six months.—Subtracting marriages which lasted less than six months, as well as those in which the diabetic partner had been ill less than six months, we get 448 diabetic marriages with nineteen cases of conjugal diabetes = 3·9.

Reckoning the possible incubation period as a complete year, and making the corresponding correction, we get 442 married couples with nineteen conjugal diabetics = 4·3 per cent. Now in Senator's opinion this percentage is too small to render the transmissibility of diabetes very probable, especially as in three of the conjugal cases both, and in another one, of the parties was hereditarily predisposed to the disease. He would in fact be disposed to deny the possibility of the disease being communicated, but for one or two very striking cases observed by himself and others. He mentions—(1) A washerwoman æt. 62, who after for six months washing the linen of a diabetic woman and her diabetic niece, herself contracted the disease. (2) A gouty patient, son of a diabetic mother, began to suffer from glycosuria. Six months later, his cook (previously perfectly healthy), who was in the habit of washing his linen, and a seamstress, who assisted the cook, also became diabetic. (3) Kulz has observed diabetes in five dwellers in one house, and Naunyn saw four cases of diabetes in persons who were not related, but lived together under one roof. (4) The second wife of a diabetic, whose first wife had died of the disease, was also a diabetic. (5) This remarkable case came under his own notice. In 1899 a doctor in a little village consulted him about diabetes, which had developed soon after he had amputated the leg of a man suffering from diabetic gangrene. At the same time there lived near by him in the same street five other diabetics, one of whom was a restaurateur, at whose table the other four, and the doctor himself, habitually dined. Six cases of diabetes collected in a single street of a village of 2500 inhabitants is a very remarkable coincidence. The question of transmissibility has also been attacked experimentally, with the following results. Freund and Töpfer injected dialysed solutions and watery extracts of the intestinal contents of diabetics into guinea-pigs, and produced glycosuria. They also caused glycosuria in dogs by introducing the fæces of diabetics into the small intestine of the animal, and by feeding dogs on the fæces. Non-diabetic fæces had no such effect. Hammerschlag obtained bacterial cultures from non-diabetic stomach contents, and from diabetic fæces, which produced diabetes in dogs and cats if given by the mouth or subcutaneously. Leo failed to cause glycosuria by using the fæces, but by injecting urine he obtained glycosuria, which did not occur after equivalent injections of grape sugar. Lepine and Boulud isolated a crystallisable substance from diabetic and other urines, which caused glycosuria when injected under the skin of guinea-pigs. Senator's own experiments have all proved negative. While none of them are at all convincing, the positive results demand that they should be repeated. Clinically, the figures alone do not favour the idea that diabetes can be communicated from one person to another, but, if the cases themselves are weighed individually, the suspicion that it is capable of transmission is hard to put aside.

SURGERY.

UNDER THE CHARGE OF
ALEXANDER MILES, M.D., F.R.C.S.Ed.,
LECTURER ON SURGERY, SCHOOL OF MEDICINE, EDINBURGH.

Abbe's Operation for Fibrous Stricture of the Œsophagus.

It is interesting to have (*Med. Rec.*, N.Y., 1907, November 30) a report after fifteen years of the first case on which Dr. Abbe carried out his procedure for dividing an impermeable fibrous stricture of the œsophagus. The patient was a young lady, who by accident had swallowed a caustic. Within a year this was followed by stenosis of the gullet, so marked that only a few drops of fluid could be swallowed, and even the finest filiform bougie failed to pass from above. Acting on the information afforded by Albert, Billroth, and others, that it is often possible to pass an instrument from the distal side of such a stricture, Abbe opened the stomach, and passed a filiform whalebone bougie through the stricture from below. To the end of this a stout string was tied and drawn up through the œsophagus and out at the mouth. An attempt was then made to pull a conical bougie up through the stricture by means of this string, but was unsuccessful at first. A second string was then passed, and was pulled backwards and forwards, saw-wise, so as to divide the stricture. While this was being done and the œsophagus was thus kept on the stretch, the bougie was pulled through the stricture by means of the first string attached to it. Larger and larger bougies were then passed until the œsophagus was fully dilated, by the combined sawing action of the string and the distending force of the instruments. The gastric fistula was closed two weeks later. The largest bougie was passed down daily at first; later once a week, and then monthly. Since the end of the first year a full-sized instrument has been passed annually; there has been no tendency to recurrence of the stricture, and the patient is in excellent health.

In June 1904, Abbe performed the same operation on a child, æt. 3, suffering from stenosis, following the swallowing of lye, and implicating more than half the length of the œsophagus. Owing to neglect on the part of the friends to have bougies passed regularly after the operation, a recurrence took place, but this was overcome by means of a dilating metal guide which carried a string down to the face of the stricture and back again, so that working entirely from the patient's mouth the stricture could be worn through on the same principle.

SPLENECTOMY.

A SERIES of interesting papers on excision of the spleen is published in the *Annals of Surgery* for January 1908. Bogart reports the case of a child, æt. 8, whose spleen was ruptured by his having been run over by a truck. There was dulness on percussion in both flanks, abdominal tenderness and rigidity, and the patient was so profoundly collapsed that, before operating, blood was transfused from the patient's mother. In about half an hour the patient's pulse had dropped from 140 to 110, and had increased in force and volume, his colour had improved, and his general condition seemed to justify an exploratory abdominal incision. A considerable amount of blood was found free in the peritoneal cavity, and the spleen was widely lacerated. The organ was removed after ligation of its pedicle. The abdominal cavity was sponged dry. Death took place three and a half hours later. On post-mortem examination there was found an extensive retro-peritoneal hæmorrhage, due to a rupture of the left renal vein and several small lacerations of the liver.

Fiske records a case of excision for gunshot wound of the spleen. The situation and direction of the wound of entrance, and the physical signs, pointed to an injury of the spleen. On opening the peritoneum, about a pint and a half of fluid blood escaped and some clots. In the spleen was a wound which admitted two fingers. The organ was excised, the pedicle being first ligated *en masse*, and then the individual vessels secured. The abdomen was flushed out with saline solution, and the wound closed—an iodoform drain being left in. Recovery was complete in about three weeks.

In reporting a case of splenectomy for Banti's disease, Gaston Torrance reviews the literature of the subject, and gives a short résumé thereof. In 1882, Banti described a disease, charactersied by enlargement of the spleen, without obvious cause, the organ being firmer than usual, but still preserving its natural contour. A progressive anæmia develops later, with occasional periods of remission; the skin becomes bronzed or pigmented, with some jaundice. This stage of the disease may last for from three to ten years. The second stage, in which the urine is scanty, high coloured, loaded with urates, and containing urobilin, may last only a few months. In the third stage there is ascites with Laennec's cirrhosis. The author has collected and gives a short résumé of each of thirty-six reported cases subjected to operation, with a mortality of 25 per cent.

Mary Almira Smith reports what she believes to be the fourth case of excision of the spleen for carcinoma. The patient was a woman, æt. 49. After her first confinement the abdomen did not return to its normal size, and she complained of a dragging sensation and became easily fatigued. About two years later she first noticed a tumour in the abdomen, which rapidly increased within the next three months, and became very sensitive. This proved to be a proliferating cyst adenoma of both ovaries of malignant type, and was removed by operation. Ten years later she complained of pain in the left side, rapid emaciation, and loss of strength. Eventually a large, firm, nodular mass was found under the left costal arch, filling the whole left side, which was dull on percussion. The urine was normal. Red corpuscles, 5,500,000; whites, 8500; hæmoglobin, 70 per cent. The abdomen was opened and the tumour found to be an enlarged spleen, which was removed. The patient made a good recovery from the operation, and returned to her family duties, but subsequently died from recurrence seven months after the splenectomy. The microscopic examination showed it to be a colloid carcinoma.

THE REMOVAL OF A TUMOUR OF THE HYPOPHYSIS BY THE NASAL ROUTE.

SCHLOFFER (*Centralbl. f. Chir.*, Leipzig, 1907, July 27) reports a case in which a tumour of the hypophysis cerebri was removed through the nasal route. The patient had suffered for some years from pains in the head, which had recently become worse. The hair had fallen out, he had lost potency, and there was bitemporal hemianopsia. This last symptom, together with the X-rays, founded the diagnosis of a tumour of the hypophysis, and operation was called for on account of the unbearable headache. The whole nose was turned over to the right; the turbinates and septum excised, and the bleeding arrested by packing. There were then removed the inner wall of the left orbit and of the left maxillary antrum, and a part of the nasal process of the left upper jaw. Finally, the ethmoid cells were cleared out and the sphenoidal sinus opened. The bony roof of the nose having been removed, the anterior wall of the sella turcica was reached, and behind this was seen a pulsating tumour, which after incision of the dura was in greater part shelled out. The bleeding was not great, but there was a great loss of cerebro-spinal fluid. The cavity was packed with gauze soaked in balsam of Peru, which was only removed on the ninth day. After a second packing was introduced, the nose was stitched *in situ*. Cerebro-spinal fluid flowed away for thirteen days. The headaches disappeared, but the hemianopsia remained.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF
F. W. N. HAULTAIN, M.D., F.R.C.P.Ed.,
PHYSICIAN FOR DISEASES OF WOMEN, DEACONESS HOSPITAL, EDINBURGH;
AND
J. A. C. KYNOCH, M.B., F.R.C.P.Ed.,
PROFESSOR OF OBSTETRICS AND GYNÆCOLOGY, ST. ANDREWS UNIVERSITY.

Kraurosis Vulvæ, complicated with Epithelioma.

Edgar (*Glasgow Med. Journ.*, 1907, December, p. 481) gives as the chief symptoms of kraurosis, intolerable itching and burning of the external genitals with dyspareunia and a feeling of constriction. On examination the parts are found atrophic. He refers to Jayle's classification of the disease as follows:—(1) White kraurosis (leucodermic). (2) Red kraurosis—(*a*) vascular, (*b*) follicular, in which the follicles at the vaginal entrance are inflamed. (3) Senile form, showing absence of the nymphæ, nerves, and glands. (4) A post-operative form occurring after double oöphorectomy. Edgar gives full reports of four cases of the leucodermic type, three of which presented signs of epithelioma two to three years after the onset of the disease, the remaining case, however, being free of any signs of malignancy for over five years. In view of the liability to malignant degeneration, Edgar recommends that all cases of the white variety should be treated by free and early excision of the affected areas.

Uterine Myoma as an Obstacle to Labour.

V. Feldberg (*München. med. Wchnschr.*, 1907, No. 45) gives the following conclusions:—(1) The prognosis of labour complicated by myoma is less unfavourable for both mother and child than used to be supposed. With strict attention to asepsis the puerperium in such cases runs a favourable course. (2) Surgical interference when found necessary during labour is not less favourable than during pregnancy. (3) If no threatening symptoms occur, the course of pregnancy should be left undisturbed, the patient, however, being kept under constant observation. (4) Operative interference should not be undertaken during pregnancy so as to guard against possible dangers during labour and the puerperium. Such interference is only justifiable when the symptoms point to the necessity for immediate relief.

Coccygodynia successfully treated by Injections of 60 per cent. of Alcohol.

Vésian (*Rev. prat. d'Obst. et de pediat.*, 1907, p. 260) reports the case of a woman, æt. 43, who complained of acute pain on pressure through the posterior vaginal wall at the level of the coccyx. Hypodermic injections of cocaine (1 per cent.), and the application of the cautery had been tried without benefit. Two c.c. of a 60 per cent. alcohol solution were then injected into the muscles about 3 cms. behind the anus in a direction parallel with the finger introduced into the rectum. The injections caused pain at the time, but they were not followed by any inflammatory reaction, œdema, or swelling. The result was very satisfactory. The pain completely disappeared, and the patient presented herself three months later, suffering no pain, and able to do all ordinary work.

The most Rapid Method of Inducing Labour by Dilatation.

Bossi (*Gyn. Rund.*, 1907, Part 20) states that dilatation may be accomplished with his instrument in from one-half to two hours. He believes that the longer time is preferable. If danger presses, however, the operator may hurry the dilatation. As soon as the instrument is introduced it acts as a foreign body and causes energetic contractions. The dilator has a dynamic as well as a mechanical effect. Many dilators are faulty in their construction, and this has frequently brought the method into disrepute. The instrument should never be introduced through a speculum or with the cervix held by a vulsellum forceps. It should always be introduced along the hand, and never blindly. Towards the end of pregnancy at least an hour should be consumed in dilatation, and the blades changed from time to time in order to avoid tearing the cervix. The dilator may also be used with submucous fibroids in the uterine canal to permit the removal of the growth.

Sloughing of Bladder with Retroflexed Gravid Uterus.

Orthmann (*Centralbl. f. Gynäk.*, Leipzig, 1907, No. 49) reports the case of a woman, æt. 18, who complained of pains in the region of the bladder after two months' amenorrhœa. By the fourth month of pregnancy there was incontinence of urine. The urine was smoky, very fœtid, and contained broken-down pieces of tissue as well as blood clot. The uterus was retroflexed and incarcerated. The bladder was distended to an extreme degree, and its walls thickened. The uterus was replaced, without interruption of pregnancy, which was going on favourably at the sixth month. The bladder was at first irrigated with 2 per cent. boracic lotion, and urotropin with ura ursi was given internally, causing the urine to become quite clear.

Delivery of the Placenta.

Rudaux (*La Clinique*, 1907, December) states that after the birth of the child, the uterus is found contracted and at the level of the umbilicus. In a few minutes the fundus rises above this level, indicating that the placenta has entered the lower segment, and that the latter has expanded so as to accommodate it. At this stage Rudaux recommends that a hot douche be given. In twenty minutes or so the fundus will be found below the level of the umbilicus, showing that the placenta is in the vagina. Delivery of the placenta is now effected by combined suprapubic pressure and traction on the cord. The membranes have to be withdrawn with care, as the uterus contracts vigorously after the placenta is expelled. If membranes or cotyledons are retained Rudaux recommends their immediate removal either with the finger or curette. The placenta should be carefully weighed, as it bears a close relation to the weight of the child.

CÆSAREAN SECTION FOR HYDATIDS OF THE PELVIS.

KÜSTNER (*Centralbl. f. Gynäk.*, Leipzig, 1907, No. 44) reports the case of a patient, æt. 36, who had five normal labours, the last child being born four years before she came under observation. When seen, pregnancy had advanced to the eighth month. A fixed mass was found in the pelvic cavity about the size of a fist. The patient had previously been operated on for hydatid of the liver. Cæsarean section was performed at the thirty-fifth week, and the uterus was amputated as low as possible so as to allow of complete removal of the pelvic tumour, which proved to be a multilocular hydatid cyst. The tumour occupied Douglas's pouch, and burrowed so deeply downwards that the vagina was opened into during its removal. No echinococci were found in the peritoneal cavity or abdominal organs. The patient recovered, but the child died from intracranial hæmorrhage shortly after birth. Küstner finds that about fifty similar cases have been reported.

ACUTE SYMPTOMS FROM TORSION OF A DILATED TUBE.

STRETZ (*Centralbl. f. Gynäk.*, Leipzig, 1907, No. 46) reports the case of a woman, æt. 36, who was suddenly seized with severe abdominal pain. Menstruation had just begun, and became very profuse with the onset of the pain. The patient had been three times pregnant, the last time twelve years before coming under treatment. On examination an elastic, tender tumour was felt to the right side of the uterus, which was slightly enlarged. On opening the abdomen it was found that the right appendages were twisted on their long axis, forming a livid purple tumour, adherent to surrounding parts. The swelling had rolled forwards over the round ligament, and came to be in front of the bladder. It was found to consist of an enlarged ovary with a dilated tube, which showed signs of old salpingitis. The case had probably originally been a pyosalpinx which had undergone axial rotation, which latter had caused hæmorrhage into the cyst.

MANUAL SEPARATION OF THE PLACENTA.

ADLER and Kraus (*Monatschr. f. Geburtsh. u. Gynäk.*, Berlin, Bd. xxv. Heft 6) reports 452 cases of manual detachment of the placenta in 40,000 confinements (1·13 per cent.). In 217 cases (0·54 per cent.) this was done on account of adhesion and profuse hæmorrhage during the third stage. In the remaining 235 cases the indications were such conditions as—threatened infection, in placenta prævia with slight bleeding, after rapid delivery followed by uterine atony, lacerations of cervix, vagina, or perineum. In 161 cases in which detachment of the placenta by hand was the only operative interference, the morbidity amounted to 2·8 per cent., and there was no mortality. With proper precautions the manual detachment of the placenta is not an operation dangerous to life.

THERAPEUTICS.

UNDER THE CHARGE OF

RALPH STOCKMAN, M.D., F.R.C.P.Ed.,

PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY;

AND

FRANCIS J. CHARTERIS, M.D.,

ASSISTANT TO THE PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY.

Meningococcic Serum in Cerebro-spinal Fever.

Schultz puts upon record his experiences obtained while treating at the same time parallel cases of the disease with and without serum. The serum used was that of Kolle-Wassermann, obtained by treating horses with the causative germ. Tested against lethal doses in animals, the serum confers a certain degree of protection. It is doubtful whether this is of the nature of a bacteriolytic process, or by a stimulation of phagocytoses. In Schultz's series of cases the serum did not give any striking results. He treated at the same time forty-one cases without serum, and twenty-three with serum. In both series the general treatment was the same, *i.e.* he used baths, antipyretics, lumbar and cerebral puncture, etc. The effect of injecting the serum was not marked on the subsequent course of the temperature; thus sixteen times after the injection the temperature remained unaltered. In the remaining cases in which an alteration was noted, the temperature went up as often as it was reduced. Similarly, the effect upon the general condition of the patients was by no means constant. Lastly, the mortality records do not say much for the activity of the serum. Of the twenty-three cases treated with serum thirteen died, equal to a mortality of 56·5 per cent. As the mortality among the forty-one cases not treated with serum was 53·7 per cent., the advantage of using serum is not obvious. It appears, further, that early use of the serum does not increase its efficacy; so that we are justified in concluding that this particular serum is quite useless in the treatment of cerebro-spinal fever.—*Berl. klin. Wchnschr.*, 1907, No. 52.

Thyroid Extract in Migraine and Epilepsy.

Gordon points out that certain functional nervous diseases, which depend upon the presence in the organism of toxic products manufactured in some way, improve in a marked fashion under the use of thyroid medication. Migraine, which is certainly due to a disturbed metabolism, seems to have some relationship to a faulty thyroid function. In some cases it will be found that the administration of thyroid extract markedly improves the general condition, and diminishes the frequency of the migraine attacks. In six cases of epilepsy, which were kept under close observation, the connection between deficient thyroid function and the nervous disturbance was fairly clearly made out. After prolonged treatment, with regulation of diet, avoidance of stimulants, intoxicants, and the use of bromide treatment, only limited improvement was obtained. On the institution of thyroid treatment, a remarkable change took place in the general condition of the patients. The apathy, lassitude, and headache have all gradually disappeared, the gastro-intestinal digestion improved, and the number of fits became less frequent; so that, instead of occurring at short intervals, they now take place at intervals of months. He concludes, therefore, that in a certain class of epileptics the seizures are in direct relationship with a disturbed function of the thyroid gland. In such case failure of the ordinary method of treatment depends upon the want of thyroid feeding, and it will be found that the administration of the thyroid extract will prove of great benefit.—*Therap. Gaz.*, Phila., 1907, December 15.

Breathing Exercises in Pulmonary Emphysema.

Hofbauer holds that the modern proposal of the surgeon to resect portions of the ribs, with the object of rendering the ribs more mobile, is unsound. He has examined healthy men by the Röntgen rays, and finds that even during forced expiration the ribs do not approach any nearer to one another; the mechanism of forced expiration is a more ample excursion of the diaphragm into the chest. He finds that considerable benefit results from the assiduous use of breathing exercises in emphysema. Normally expiration is unconscious, and is due almost entirely to the elastic recoil of the tissues. When, therefore, an emphysematous patient becomes conscious of shortness of breath, he instinctively tries to obtain relief by altering his type of breathing. The most natural way for him to do so is to increase the inspiratory portion of the act. As a result, he only intensifies the evil, as he increases the inspiratory at the expense of the expiratory portion. The breathing exercise should completely reverse this process. He should be taught to pay attention to the expiratory movements, and not to the inspiratory. This is best effected by using an automatic time-marker, which indicates how long the expiratory act should last. At the same time, an elastic pressure over the upper part of the abdomen helps the expiration by pressing the abdominal viscera on the diaphragm, and thus forcing it into the chest cavity. Towards the end of the expiration the patient should aid expiration by a powerful contraction of his abdominal muscles. Hofbauer states that he has found this treatment of great benefit. At first it can only be done by a voluntary effort of the patient, but in a short time it becomes quite automatic, and then markedly relieves the breathlessness. The objective improvement is seen in an actual shrinking of the bulky lung, which can be shown by careful percussion.—*Ztschr. f. diätet. u. physikal. Therap.*, Leipzig, 1908, January.

SILVER NITRATE IN GASTRIC DISEASES.

WEINSTEIN warmly advocates the use of nitrate of silver in conjunction with other treatment in such conditions as hyperchlorhydria, pain due to acute or chronic ulcer, benign pyloric stenosis, and in gastritis due to alcoholism or other cause. It acts well in irritative conditions of the gastric mucous membrane, characterised by increased secretion, nausea, vomiting, and pain. It is absolutely no use in pure gastric neurosis; but, in the conditions mentioned, nitrate of silver gives prompt relief to the symptoms, and enables a proper treatment of the cause of the disease to be carried out. Weinstein administers the drug in solution, giving doses of ½ gr. three times a day on an empty stomach. No food or water is allowed for half an hour after its administration. It is rarely necessary to continue its use for more than three weeks, but even if it is used for a month there is no danger of argyria with these doses. —*N.Y. Med. Journ.*, 1907, December 28.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

R. F. C. LEITH, M.B., F.R.C.P.Ed.,

PROFESSOR OF PATHOLOGY, THE UNIVERSITY, BIRMINGHAM.

THE RELATION OF THE EOSINOPHILIC CELLS OF THE BLOOD, PERITONEUM, AND TISSUES TO VARIOUS TOXINS.

C. P. HOWARD worked at this difficult subject in the Laboratory of the Second Medical Klinik of the Allgemeine Krankenhaus, Munich, under Professor F. Muller, in the hope of adding to our knowledge of the function of the eosinophilic cell in inflammation, and publishes his results (*Journ. Med. Research*, Boston, 1907, December). Neutrophilic and eosinophilic cells react differently to irritants. The clinical value of eosinophile cells is not a subject of general agreement. Their number is so generally increased (eosinophilia) in certain diseases, *e.g.*, in some myelogenous leukæmias, in some cases of chlorosis, bronchial asthma, nephritis, pemphigus, in scarlet fever and in smallpox, and notably in helminthiasis, particularly trichinosis, that they become of diagnostic importance. In like manner a diminution in number (an eosinophilic leucopenia) is met with in many acute infections accompanied by high fever, *e.g.*, typhoid, pneumonia, measles, and septic processes. Howard's experiments were performed upon guinea-pigs through the introduction of various substances (salt solution, egg albumin, and typhoid toxin) and certain bacteria (*Streptococcus pyogenes* and *B. anthracis*) by means of the subcutaneous tissues, the peritoneal cavity, or the anterior chamber of the eye. He found that the leucocyte count in the guinea-pig varied from 6800 to 22,000 per cm., with an average count of about 12,000 per cm., and that it was therefore necessary, to avoid error, to count the blood immediately before inoculation in every case. After the injection of any of these substances into the subcutaneous tissues, the peritoneal cavity, or the anterior chamber of the eye, he found that there is a prompt and general diminution in the number of the eosinophiles in the blood of the general circulation. Upon intraperitoneal inoculation there is a definite and often marked decrease of the eosinophiles locally, and that upon injection into the anterior chamber of the eye there is at least no local increase. Therefore the eosinophile cell is a specific cell and reacts to these substances differently from the polymorpho-nuclear cell, showing none of the positive chemotaxis exhibited by the latter, but possibly a negative chemotaxis. It may be that toxins destroy eosinophile cells not only in the circulating blood and locally, but also injure the bone marrow and temporarily paralyse the reproductive activity of the eosinophilic mother cells.

An Eosinophilous Meningitis of Local Origin without Eosinophilia in the Blood.

E. Mosmy and P. Harvier (*Arch de méd. expér. et d'anat. patho.*, Paris, 1907, tome xix. pp. 275–281) whilst observing a case of syphilic meningitis made three lumbar punctures, which all showed abundant lymphocytes in the cerebro-spinal fluid, but in the fluid from the two last there was also a number of eosinophiles amounting to about 5 per cent. Some of these were mononucleated, most had a bilobed nucleus, and a few had a trilobed nucleus. They were able to see all intermediate forms between the lymphocyte and the polynuclear eosinophile, thus confirming the opinion of Dominici that the latter spring from the former. They think that in their case the local origin of the eosinophiles is incontestable, seeing that there was no eosinophilia in the blood, and that it is comparable to the eosinophilous pleurisy recorded by Widal and Faun-Beaulieu.

On the Reversion of Carcinoma to Adenoma experimentally produced in Mice.

Apollant (*München. med. Wchnschr.*, 1907, No. 35, S. 1720) has examined a number of tumours from animals treated by the immunising methods of Ehrlich and Bashford. He no longer thinks that the alteration of an adenomatous or papillomatous type of growth into that of a solid reticular cancer is dependent upon an increase of virulence, but upon biological changes in the resisting powers of the host. One strain of solid reticular carcinoma (of which he examined many specimens) preserved its character even up to the sixty-fourth generation, but nevertheless exhibited, in many of the tumours, parts with a typically adenomatous structure and other areas which might be interpreted as transition forms between carcinoma and adenoma. In his first series of experiments a mouse received an immunising injection of a non-virulent tumour of spontaneous origin on the day after inoculation with a virulent carcinoma. The latter was excised six days afterwards, and showed no acinous structure. It recurred in the same site, but grew very slowly and was again removed twenty days after the last operation. A virulent growth was then inoculated, and it grew very slowly. Both it and the recurrent tumour showed an adenomatous and not an acinous structure. The author suggests that the immunity though not yet great enough to influence the first tumour had, on the other hand, become sufficient to modify the recurrent growth and the tumour resulting from the second inoculation. In his second series of experiments the animals growing the tumours (of which twenty-seven were examined) were immunised by injections of blood from various animals, sixteen with mouse blood and others with rabbit, rat, or guinea-pig blood. The tumours showed an adenomatous type in four out of the sixteen treated with mouse blood, but no alteration in any of the others. The author thinks that the importance of these results lies in the demonstration that the progressive development of adenomatous tumours into carcinoma can be reversed, and that too hard and fast a line should not be drawn between adenoma and carcinoma. He thinks that his findings show that by simply restoring the lost tissue resistance a cancer growth can be converted into a simple benign tumour.

The Transplantation of Human Carcinomatous Material into Lower Animals.

Guthrie M'Connell (*Journ. Exper. Med.*, N.Y., 1908, January 1, p. 36) points out that previous experiments in this direction have been without definite results, for the few instances in which success has been claimed have not been convincing. He records the result of an experiment by himself in which a small part of a scirrhous cancer of the breast was implanted subcutaneously in the abdominal wall of an adult white rat and a like piece into a white rat about four weeks old. In the latter there was complete absorption of the implanted tissue within ten days. In the older rat it was not absorbed, but walled off by a connective-tissue capsule, no new blood vessels were formed, and the pre-existing ones failed to nourish the cells of the tumour. Consequently, there was a degeneration of the epithelial element, though the connective-tissue stroma suffered but little. The bodily resistance in the younger rat was thus greater than in the older. The conditions necessary for the rapid destruction of the implanted cancer, present in the former, were lacking in the latter, and seeing that it remained unabsorbed in this rat even after five months, a successful inoculation might follow a slightly lowered degree of rat resistance or an increased tumour virulence.

The Tumours of Mice Inoculable and Spontaneous.

E. E. Tyzzer (*Journ. Med. Research*, Boston, 1907, November) has contributed three excellently illustrated papers on tumours in mice. The first deals with the inoculable tumours. He kept up inoculations with the Jensen tumour for ten generations or transplants. Actively growing tumours developed in 73 per cent. of the normal mice inoculated. Sixteen per cent. of the tumours developed for a time, but later disappeared spontaneously. The reinoculation of mice in which the first inoculation had resulted negatively produced tumours in only 20 per cent., in some of which the tumour appeared early, in others late, after the inoculation. One which appeared sixty days after inoculation attained great size. With Ehrlich's "Stamm II." tumour ten transplants were made, and actively growing tumours appeared only in 52½ per cent. of the normal mice inoculated. Tumours of this strain show greater regularity of growth than the Jensen tumours. The tumours of both strains are often largely necrotic, probably due to the excessive growth of the epithelium outstripping its vascular supply. Metastases were present in four of the seventy-three mice in which the Jensen tumour developed, conveyance being by the blood vessels, not by the lymphatics. The second paper deals with spontaneous tumours in mice which include the following:—(1) Papillary cyst-adenomata of the lung in twelve mice. They are doubtfully benign. (2) Cyst-adenomata of the kidney in two mice. They are probably benign. (3) Lympho-sarcomata in two mice. They are malignant. (4) Subcutaneous adeno-carcinomata in four mice, in three of which metastasis occurred. (5) Inoculations of the above tumours into healthy mice succeeded in two only of the adeno-carcinomata and in none of the others. (6) Spontaneous tumours originating subcutaneously appear to metastatise much more frequently than either Jensen's or Ehrlich's "Stamm II." inoculable tumours similarly situated. The lymph glands are frequently invaded by the spontaneous tumours, but not by the inoculable ones, except in the case of an inoculable tumour in a Japanese mouse. (7) The pathological processes accompanying tumours in mice have no special significance. (8) Double primary tumours are of frequent occurrence. On the influence of heredity in the development of tumours in mice he concludes from his breeding experiments that the results neither prove nor disprove that heredity has an influence, though they favour the former view. It seems probable by certain lines of experimental breeding, with the principles of Mendel's law of heredity in mind, to obtain definite positive or negative results. Another interesting paper on the inoculation of tumours comes from Leo Loeb and Leopold in the December Number of the same journal, whose results are thus summarised—(1) The lympho-sarcoma of dogs has the widest range of inoculability, for it can be transplanted into other species like the fox. (2) The sarcoma of white rats and the adeno-carcinoma of white mice can be transplanted not only into white rats and white mice respectively, but also, though with much difficulty, into hybrids between white and grey (wild) rats, in the case of sarcoma, and into grey mice in the case of adeno-carcinoma of white mice. (3) The adeno-carcinoma of the Japanese mouse cannot be transplanted into white mice, though it can be transplanted into all Japanese mice. (4) A fourth class of tumours cannot be inoculated into other animals of the same species. This class comprises the majority of tumours, and includes most of those met with in man and the lower animals. It is highly probable that many, if not all, of the tumours in man can be inoculated only into the same individual who developed the original tumour.

PHYSIOLOGY.

UNDER THE CHARGE OF

T. H. MILROY, M.D., F.R.S.E.,

PROFESSOR OF PHYSIOLOGY, QUEEN'S COLLEGE, BELFAST.

Hot Air Baths.

This mode of treatment is by no means a new one, but until comparatively recently the methods of applying it were in many respects faulty, and as a result the opinions expressed by those who have tried it have been most conflicting. In the collection of papers issuing from the Physiological Institute Helsingfors, and dedicated to Professor Hammarsten, there is one by von Willebrand on this subject (*Skandin. Arch. f. Physiol.*, Leipzig, Bd. xc. S. 123). His physiological experiments were mainly carried out with the view of determining the effects of exposure of limited portions of the body to dry air at high temperatures. The effects on blood pressure, pulse frequency, respirations, and body temperature were studied on dogs under morphia, atropin, and chloroform. It is by no means certain that the very high temperatures (140° to 160° C.) stated by the author are correct, because other investigators have shown that the thermometer in the apparatus employed is usually placed where the temperature reaches a much higher level than in the neighbourhood of the part being treated. However, when the thermometer registered temperatures from 130° to 160° (probably only about 100° to 120° in reality), the carotid blood pressure rose about 23 to 55 mm. Hg. The greatest rise was not observed at the highest temperature, but there seemed to be a mean optimum temperature (about 130°) below and above which the pressure fell.

The pulse frequency and the general body temperature were practically unaffected, but, as has always been observed, the number of respirations was increased. In very few cases were bad effects, such as signs of cardiac weakness, to be observed. The writer's clinical observations on patients were made on a variety of cases, those being selected which, it seemed likely, might prove amenable to such a mode of treatment, *e.g.*, various forms of arthritis, muscular rheumatism, tendo vaginitis, œdema after venous thrombosis, etc. Beneficial effects were most marked in cases of subacute rheumatism, less distinct in chronic, and absent in gonorrhœal cases.

In the other cases mentioned good results were also obtained. According to the writer, these good results were most probably due to the following:—(*a*) Increased rate of absorption of fluid in the hyperæmic area. (*b*) Gradual removal of pathological deposits either from the phagocytic action of the increased number of leucocytes in the area, or from the setting free of autolytic enzymes under conditions of increased cellular activity. (*c*) Local analgesic effects. (*d*) Facilitation of regenerative processes.

Pupillary Light Reflexes.

It has been usually held that light falling upon practically any part of the retina will produce in the normal individual reflex contraction of the pupil. As Hess points out (*Arch. f. Augenh.*, Wiesb., 1907, Bd. lviii. S. 2 and 3), this has been by no means definitely proved. As a rule, sufficient care has not been taken to accurately localise the stimulated zone, the influence of dispersed light not being taken into account. Hess has most carefully investigated the subject anew, and finds that there is only a small area in the central portion of the retina which on stimulation produces reflex contraction of the sphincter pupillæ. Stimulation of the more peripheral parts, when accurately defined, produces no effect. Hess gives the diameter of this small central zone as less than 4 mm. One can readily understand the importance of Hess' work in its relation to various pathological conditions, *e.g.*, pupil reactions in hemiopia. The outer parts of the cones are probably the end organs which are stimulated. Hess, in a later paper in the same journal, points out that there are many objections to the general view that the rods, as carriers of the visual purple, are specially employed in the case of adaptation for dim light. The retinæ of day-birds are very poor in rods, and yet in dim light such birds possess a very fine power of accurate localisation, certainly as fine as the human eye with all its wealth in rods and visual purple. From experiments on albino rabbits, the pigment seems to play no important part in the dark adaptation of the eye. With regard to the limits of the visible spectrum in birds, it appears that, compared to man, there is no shortening of the red end, but a very marked absence of response to the rays of short wave length which are quite visible to us. The outer parts of the cones seem to be the end organs stimulated by monochromatic light in the case of hens and pigeons. Nagel, from some rather quaint experiments on the colour sense in dogs (*Centralbl. f. Physiol.*, Leipzig u. Wien, 1907, Bd. xxi. S. 7), states that with practice they may be taught to recognise the colour quality of an object. This is evidently especially true for reds (including orange). The colour sense is by no means acute, being somewhat similar to that of a child of 2½ years.

Sham Feeding and Gastric Secretion.

Helene Katznalson (*Arch. f. Physiol.*, Leipzig, 1907, Bd. cxviii. S. 327) made some observations in the case of a girl, æt. 18 years, with œsophageal and gastric fistulæ. The experiments were of the same nature as those described by Pawlow in the case of the dog. The most diverse gustatory and olfactory stimuli were effective in calling forth a free secretion of gastric juice or in increasing the flow which had been started by another stimulus. It seemingly did not matter whether the substances had a pleasant or unpleasant taste or odour so long as the stimulus was a powerful one.

The latent period was extremely short, while with such substances as bread, milk, and meat where the gustatory and olfactory stimuli were not so intense, the latent period was the usual prolonged one of five minutes. Purely mechanical stimulation of the mouth produced no effect on gastric secretion. The writer found that the ordinary foodstuffs affected the amount and character of the juice in the same way as was found to be the case in the dog.

DISEASES OF THE EYE.

UNDER THE CHARGE OF
GEORGE A. BERRY, M.B., F.R.C.S.Ed.,
CONSULTING OPHTHALMIC SURGEON, EDINBURGH ROYAL INFIRMARY;
AND
W. G. SYM, M.D., F.R.C.S.Ed.,
OPHTHALMIC SURGEON, EDINBURGH ROYAL INFIRMARY.

Neuro-paralytic Keratitis after Excision of the Gasserian Ganglion.

The danger of destructive keratitis after excision of the Gasserian ganglion is well known to all surgeons, though the authorities are not all agreed even yet as to the precise explanation. The original trophic theory of Magendie, as well as its more modern modification, in which the cause is supposed to be paralysis of certain sympathetic fibres which have joined the fifth nerve, are both rejected by Weiss in a recent paper. He attributes the mischief, when it does occur, to drying of the cornea from insufficient covering, and the injurious effect of small and otherwise trifling injuries, which give the opportunity for the assaults of pathogenic organisms. It does not so often occur as it might do, because the normal condition of the other eye ensures the normal lubrication and moistening of the cornea on the affected side, this involuntary movement being, of course, bilateral. The author, moreover, believes that the danger of keratitis is so slight that, in a case in which the operation of excision of the ganglion seems to be genuinely called for, the dread of destruction of the cornea ought not to make the surgeon hesitate. The occasion of his writing was to publish the case of a man, æt. 47, whose cornea had remained still perfectly transparent four years after the operation. He suffered from excessive sweating of the face, especially on the unoperated side; while on the left (operated) side the whole area of distribution of the fifth nerve was completely anæsthetic, including the cornea. There was also slight drooping of the left upper lid, and fine fibrillary tremor of the orbicularis palpebrarum.—*Klin. Monatsbl. f. Augenh.*, Stuttgart, 1907, August–September.

Variations in the Amplitude of Accommodation at Different Periods of Life.

An interesting paper on this subject has just appeared from the pen of Jackson (Denver, U.S.A.), who has been stimulated to put on record his attitude towards the matter by the publication of a singular statement by another American ophthalmic surgeon, to the effect that "many of our puzzling non-successes are due to failure to recognise insufficient or paretic accommodation, or premature presbyopia. The books do not know of it, and the lecturers do not speak of it." Like others who are careful in their examination of their patients, Jackson is astonished that such a statement should be made; but perhaps few can go so far as to say with him that he has never prescribed a pair of glasses to a patient under 55 years of age without testing the amplitude of accommodation. The tables which he has drawn up with care from the records of more than 3000 patients, in whom the point was tested specially and recorded fully, show that in persons of the same age and with apparently healthy eyes there is quite a wide range of variation in the amount of accommodation present. They bring out, further, that subnormal accommodation is neither rare in fact nor unimportant in practice, and that the age at which presbyopia begins consequently varies very considerably. These are, as above indicated, not new facts; but the importance of them is perhaps hardly sufficiently recognised. A curious point, for which we were not prepared, seems to be that in female patients the average amplitude of accommodation falls below that present in males of the same age. A cynic might suggest that this was due to the "minimising" of the antiquity of ladies whose early youth was a thing of the past; but this can hardly be the explanation, for it is true of *every* period of five years from infancy (5 to 10) to that of senility and total failure of accommodation after 65. The degree of difference is not great, but it is present too constantly to be the result of an error of observation.

As regards the age at which presbyopia comes on, one is constantly meeting with exceptions to the text-book rule, which, like all rules of thumb, is not of universal application. But it is certainly more common to meet with favourable than with unfavourable exceptions to it—with patients, namely, who possess more than the average power, or who keep the power longer, than with those in whom accommodation falls below the standard, and who are therefore presbyopic at an earlier date. —*Ann. Ophth.*, St. Louis, 1907, vol. xvi. p. 3.

Gomenol.

Gomenol is the natural essence obtained from *Melaleuca viridiflora*, a native of Guiana. Experiment on the lower animals proves that, while strongly antiseptic, it is neither caustic nor toxic: after the first movement it has a definite anæsthetic effect. Ambialet, after trying it upon animals, mixed with oil in various proportions and finally pure, and then upon himself, determined to employ it to quicken the slumbering nutritive processes in a case of interstitial keratitis in which all activity had ceased. Dionine had been used, but the tolerance which is one of the unfortunate facts about dionine, had become established, and it had quite lost effect. Massage, atropin, and mercury internally had also failed; and the left cornea was nearly white, quite non-vascular, slightly ectatic, and intransparent. Vision was reduced to mere perception of light. Fortunately the other eye had made a good recovery. The child, a little girl, æt. 13, was manifestly a hereditary syphilitic patient, with sabre-blade tibiæ and typical Hutchinson's teeth. At first he employed it every second day, then daily, and as soon as after the third instillation a fine injection began to be manifest round the cornea when examined with the loupe. Gradually a band of fine vessels made their way into the centre of the cornea from the periphery. In about ten days there was a very decided improvement in the clearness of the periphery of the cornea. In ten days more the patient could count fingers at 1 metre, and, with continued treatment and continued progress, at 5 metres in one month. Eventually vision of $\frac{1}{5}$ was secured in six months, and this remained.

Ambialet is satisfied that there is no question as to the wonderfully good effect of gomenol in this case—an effect which, he thinks, could not otherwise have been secured—and he is prepared to use it again. After the instillation there is a pretty sharp smarting, somewhat like what there is after nitrate of silver; but this does not last three minutes, and at the end of that time there is a very decided feeling of comfort, from the anæsthetic effect; the eye is well opened, and, though very considerably injected, is quite at ease. The hyperæmia, which affects the deep vessels as well as the superficial, lasts an hour or so, and then gradually passes off. In children and in nervous persons, cocaine can first be instilled without any detriment to the good influence of the drug.—*Ann. d'ocul.*, Paris, 1907, December.

Hereditary Optic Atrophy.

Leber's disease, as it is sometimes called, or hereditary optic atrophy, is a disease of much interest, illustrating as it does the curious manner in which a morbid condition may descend from generation to generation. The case or cases recorded by Hancock seem to show that the bad prognosis which one is in the habit of associating with this disease may in certain instances be falsified. His patient was, as is almost always the case, a young man, æt. 26, who rapidly lost vision till it was reduced in the case of each of his eyes to counting fingers; he gave an account of seeing as through a mist, and he had a definite scotoma in each eye. The discs were faintly hazy, and very pale indeed. The only point at all unusual in an otherwise perfectly typical case was that he was epileptic, and had been rather heavily dosed with bromide. No other organic disease could be discovered. His family history was very interesting and very typical: the patient himself was one of six males affected, in the fourth generation from a man who was (if the history obtainable could be trusted) attacked in an exactly similar way. None of his immediate family had been affected, but of the families of two of his daughters, four persons (all males) had been attacked. Of some forty odd persons in the fifth generation from the "original sinner," *i.e.* in the next generation below Hancock's patient, only one, also a male, had shown any signs. In short, the family history was quite typical, in respect—(1) That only young males were attacked; (2) that the males, sound or unsound, did not transmit the disease, but that it passed always through the female line; and (3) that after three or four generations the disease appeared to be dying out. These facts are mentioned that there may be no question whatever of the accuracy of the diagnosis. Yet the sequel was unlike what usually occurs; for, under improved general conditions, a long voyage, reduction of the large quantity of bromide, and taking Fowler's solution, he so far recovered that the central portion of his scotomatous area cleared up, leaving only a narrow ring of loss, about 5° to 8°, round the fixation spot, so that vision rose to $\frac{6}{24}$. Finally, even this ring became broken, and only a crescentic scotoma remained. None of the other affected persons in the family tree could be examined with so great precision, but in the case of several of them also it is known that partial recovery took place. The same peculiarity, namely, partial recovery, has been observed as a rarity in other families in whom the disease had appeared. It is noteworthy that though in certain respects there is a superficial resemblance to cases of tobacco amblyopia, and though the disease occurs in persons who probably smoke, and may perhaps smoke to excess, yet cessation or continuance of use of tobacco has no influence on the progress of the malady.—*Roy. London Ophth. Hosp. Rep.*, vol. xvii. p. 2.

REPORTS OF THE MEDICAL SOCIETIES.

Edinburgh Medico-Chirurgical Society.—*February* 5, 1908.—Dr. Hunter, Vice-President, in the chair.—Mr. Caird showed—(1) Patient after removal of a submaxillary gland in the case shown at last meeting; (2) a patient after removal of half of the tongue and floor of the mouth for epithelioma.—Mr. Scot Skirving showed a large pedunculated fibroid, uterus, and adnexa removed by abdominal hysterectomy from a patient, æt. 70, in which a complete twist of the uterus had occurred, causing strangulation of the uterus and symptoms of acute intestinal obstruction.—Dr. Dawson Turner read a paper entitled "Electrolysis in Medicine and Surgery," which will appear in an early issue of the Journal.

Edinburgh Obstetrical Society.—*February* 12, 1908.—Professor Stephenson, President, in the chair.—Dr. W. H. Miller showed a placenta from a case of triplets.—Sir Alexander R. Simpson exhibited an Egyptian birth-chair, and gave an account of its mode of use, illustrating his communication with photographs. He found such chairs or stools in use as far up the Nile as the second cataract. They were the property of the midwife, and may have been of the same sort as those which Shiphrah and Puah used to carry with them for the births of Hebrew children, but arrived only in time to find the labour finished.

Glasgow Medico-Chirurgical Society.—*January* 31, 1908.—Dr. Walker Downie in the chair.—Dr. Albert A. Gray read notes and showed specimens from a case of abscess of the temporo-sphenoidal lobe, with rupture into the lateral ventricle. The case was operated on after the abscess had ruptured, and there was for a time marked improvement. On opening the abscess a quantity of thin opaque fluid under pressure was evacuated, which was evidently the pus mixed with cerebro-spinal fluid. There had been no shivering or vomiting at the time of rupture, but there was a gradually increasing coma. The patient died from a meningitis fourteen days after rupture. The infection had travelled from one ventricle to the other through the foramen of Monro, and from the third to the fourth ventricle through the aqueduct of Sylvius, and thence through the foramen of Magendie to the base of the brain. It was evident that the rupture had taken place gradually, being in fact more in the nature of a leakage, and this was considered to be the reason why death did not occur till fourteen days later. The primary focus was in the middle ear.—Mr. Freeland Fergus read a short paper on "Lachrymation: its Causes and Treatment."

February 21, 1908.—Dr. J. Crawford Renton showed or read notes on—(*a*) Four cases of excision of the elbow-joint; (*b*) two cases of ruptured spleen; (*c*) vesical calculi; (*d*) renal calculi; (*e*) three ruptured appendices; (*f*) four cases of intussusception; (*g*) Mayo's method of gastro-enterostomy (ten cases).—Dr. William M'Lennan related the clinical history of an unusual case of mediastinal tumour, and showed microscopic section of the growth. In the liver the secondary growths were purely sarcomatous.—Dr. Johnston Dunn showed lantern slides from sections of a case of accessory thyroid tumour of the neck, and Dr. ALEX. M'LENNAN gave a short report of the case.—Dr. ALEX. M'LENNAN gave a lantern demonstration, and read notes on "The Function of the Thymus Gland with special reference to the Changes in the Bones, etc., produced by Thymusectomy." The work on which the paper was founded had been carried on during the past ten years. The animals chosen were rabbits. The operation of thymusectomy was difficult owing to the danger of opening the pleuræ. The general results noted after the operation were, rapid recovery (in one hour the animal could not be distinguished from the others), increased weight, increased vigour, increased appetite. There were no alterations in the spleen or bone marrow. A notable change took place in the growth of bone. The epiphyseal line became greatly enlarged in rabbits and kittens, and the changes from cartilage into bone seemed to take place in fewer stages than in the normal animal. If the spleen and the thymus are both removed, the animal dies. If the thyroid is extirpated, the thymus disappears. If the thymus is extirpated, it is difficult in a month or two to find the thyroid. After the operation of thymusectomy in the child no alteration was found afterwards. In two cases of laryngismus stridulus the operation produced in one slight but progressive improvement; in the other, rapid improvement and final recovery resulted. He also found that feeding with thymus did good in exophthalmic goitre and in rickets. In removing the thyroid in cases of exophthalmic goitre, the thymus should be first removed for greater safety in the chloroform administration. In marasmus, laryngismus stridulus, croup, he found good results from removal of the thymus.

FORFARSHIRE MEDICAL ASSOCIATION.—A meeting of the Society was held in the School of Medicine, Dundee, on *Thursday, February* 6.—Professor STALKER in the chair.—Mr. GREIG showed a man after recovery from a fracture of the skull which had caused paralysis of the sixth, seventh, and eighth cranial nerves.—Dr. FOGGIE showed a man with progressive muscular atrophy, the starting-point of which was an injury to the right leg. He had a syphilitic history.—Dr. ROGERS showed a man with well-marked symptoms of Raynaud's disease.—Dr. G. WHYTE showed a case of the same disease with small ulcers on both ears.—Dr. GUILD showed two patients after operation for cholesteatomata of the temporal bone.—Dr. A. J. DUNCAN read notes on the successful treatment of a case of sciatica, which had resisted all the ordinary methods of treatment by drugs, by the subcutaneous injection of air along the line of the nerve, followed by massage, as recommended by Dr. Gubb of Algiers.—Dr. ROGERS showed a boy, æt. 6½ years, the subject of rheumatoid arthritis.—Dr. G. HALLEY described two cases of inguinal hernia in men upon which he had operated. The first was an old-standing left hernia, in the sac of which were found carcinomatous nodules, secondary to cancer of the body of the stomach, as was discovered at a later operation. The second was a large scrotal hernia which at the operation was found to contain a gangrenous appendix.—Dr. G. WHYTE read notes of a case of appendicitis in a hernial sac. The patient, a young man, was sent to hospital as a case of strangulated hernia. He had had a right-sided inguinal hernia since childhood.

OBITUARY.

JAMES BELL PETTIGREW.

THROUGH the death of Professor Pettigrew, Edinburgh University has lost one of her distinguished graduates. Pettigrew was born at Roxhill, in Lanarkshire, in 1834, and was related on the maternal side to Henry Bell, the founder of steam navigation in Europe. After undergoing his preliminary education at Ardrie Academy and taking the Arts degree in Glasgow University, Pettigrew came to Edinburgh to study medicine.

He obtained a gold medal for his thesis for the degree of M.D., and was a President of the Royal Medical Society. He went for a time to London, where he was Assistant Curator of the Hunterian Museum from 1862 to 1868, but returned to Edinburgh the following year to fill the post of Curator of the Museum of the Royal College of Surgeons. In 1873 he became Lecturer on Physiology at Surgeons' Hall, and two years later was appointed to the Chandos Chair of Medicine and Anatomy in St. Andrews University, which post he held at the time of his death. He received many honours, amongst them being—Laureate of the Institute of France, Fellow of the Royal Society, Honorary Doctor of Laws of Glasgow University. Professor Pettigrew made many valuable contributions to medical literature, and at an early part of his career investigated the muscular stricture of the heart and bladder, a research which gained for him, in 1874, the Godard prize of the French Academy of Sciences. He was greatly interested in the problem of the flight of birds, and wrote several articles upon this subject. He was a many-sided man, intellectually and in his recreative pursuits, whose death is mourned by many friends, not only in the town which for the last thirty years has claimed him, but also in that of his Alma Mater and early scientific career.

PROFESSOR VON ESMARCH.

IN the latter part of the nineteenth century there was no better known figure in official and professional circles in Germany than von Esmarch. In his personality there was as much of the soldier and the courtier as of the surgeon. At official functions he appeared in a smart uniform, his breast covered with decorations, and in Germany, where rank counts for so much, his having been made a Privy Councillor, a Peer of the Realm, and a Surgeon-General *à la Suite*, together with the fact that he had married a Princess of Schleswig-Holstein,—an aunt of the present German Empress,—entitled him to privileges and to a degree of consideration among his confrères of which he was indeed proud. He had seen a great deal of active service, having taken an active part in the Schleswig-Holstein War and in the Franco-Prussian War; in the former he was made prisoner along with the greater part of the corps to which he was attached. Many of his published works deal with the equipment of the Army Medical and Ambulance Services and with important questions in different departments of military surgery.

Outside Germany he was well known as the originator of the bloodless method of operating, and, although his bandage is no longer made use of to empty the blood vessels of the limb, his elastic constrictor or tourniquet is in universal use at the present day. Among his other claims to recognition are his work on "The Different Forms of Elephantiasis," and his work on "Surgical Technique," written along with his assistant, Kowalzig,—a work in four volumes,—which has enjoyed a large circulation and run through several editions. He was elected an Honorary Member of the Medico-Chirurgical Society of Edinburgh in 1894, an honour which is restricted to ten of the most distinguished members of the profession throughout the world.

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EDITORIAL.

Immunity and Nutrition. No disease is more prevalent in infancy than malnutrition, and of none is the pathology more obscure. Attempts to place it on the sure basis of morbid anatomy have utterly miscarried, and pathological chemistry has equally failed to yield an explanation. In the past year or two the trend of German work on this subject has been along biological lines, and has at least been fruitful in new suggestion both as to the intimate nature of marasmus, and as to the essential differences between human and animal milk from a food point of view.

The tendency at present is to look on the vital properties of human milk as of far more consequence than its chemical composition in the nutrition of the infant. The impetus to these investigations derives, of course, from Ehrlich's theory of immunity, and more particularly from studies of the precipitins by which specific albumins can be differentiated. The earlier workers had in view the possibility of the toxic symptoms which cow's milk sometimes causes being due to the direct absorption into the blood of the foreign albumin. It is known that injection into an animal of albumin from another species causes poisoning,—the "serum disease" is a well-known instance,—and evidence was brought forward that in the blood of very young artificially fed babies specific milk precipitins could be detected. The carefully planned work of Moll, however, led to the abandonment of this theory. He shows that, contrary to what might be anticipated, a foreign serum is very much less toxic to young than to adult animals, and that, parallel with the low toxicity there is but a limited production of antibodies. For the present, however, the idea that cow's milk is directly toxic must be departed from: its failings seem to be negative rather than positive.

Accepting Ehrlich's hypothesis that the body cells assimilate nourishment by means of appropriate side chains, and that for this "tropholysis" complement must be present in the serum, some very remarkable observations of Moro may be referred to. The blood of a newly-born baby contains abundant complement, which diminishes after birth, but under the influence of maternal nursing rises to the adult level in four or five days. In artificially reared infants the complement either pursues a downward course, or behaves in the normal manner. It falls in children who are not thriving, and rises in those whose weight curve is satisfactory. The difference is most striking in weaklings: of these, the breast-fed have normal complement, the artificially fed, very little; and it seems that when, despite careful dieting, the complement does not increase, the prospect of success in rearing the infant is small. Confirmation of these variations in complement in the two sets of cases comes from another series of experiments by Pfaundler. If sufficient inactivated hæmolytic serum is injected into an animal, death occurs, the hæmolytic serum being activated by the animal's own complement. This is well established; but Pfaundler now shows that if the animal—dog or rabbit—has been reared artificially, the symptoms caused by the hæmolytic serum are much less, by reason of the dearth of the necessary complement. That is to say, the ill-nourished animal (for artificially fed animals are liable to serious malnutrition) is more resistant to inactivated hæmolytic sera than the normal, healthy animal.

So far, then, we are led to conceive of marasmus as a failure to assimilate through deficiency of complement. On this theory it is easy to explain why not all artificially fed infants fall victims to it. The new arrival into the world comes provided by its mother with a store of complement, and tissues which in time will be able to elaborate more. Normally the mechanism is supplemented from the mother's breast: if that fail, the mechanism may meet the increased demand—or it may not, and marasmus ensue. In the face of such a theory it might be thought that medicine is bankrupt, but this would be a mistake. True, we cannot yet supply complement at will, but there is some reason to believe that subcutaneous saline injections favour its production, and we know empirically that they are serviceable in certain cases of marasmus.

More significant from a therapeutic point of view, however, is a knowledge of the paramount importance of nature's method of feeding during the very first days of life. It is common enough to tell a mother, " Even if you only nurse your baby for a week or two it will get a good start," but few realise what that start really means. It escaped even the perspicacity of Mr. Coleridge and the Royal Commission, that although to feed your pet pussy with cream is an act of humanity, to give milk to a newly-born kitten may be fraught with such disasters as to constitute " an experiment." Yet so it is. Moro has proved that it is almost impossible to rear young animals if suckling be prevented from the outset. Eighty per cent. of guinea-pigs fed from birth on cow's milk die; of those which remain with the mother only one day, 60 per cent. survive; while 90 per cent. of those which are suckled for three days can be reared without difficulty. The popular belief which credits the colostrum with peculiar virtues is therefore experimentally verified, and from the present point of view the further discovery that it is excessively rich in ferment-like bodies is of interest. Langer shows that the cow's colostrum contains enormously more antigens (the generic name given to substances which evoke specific agglutinins, precipitins, etc.)

than the later milk, or than the adult blood serum. These antigens do not exist in the serum of the calf at birth; the placenta, apparently, is impermeable to them, and the young animal comes into the world defenceless to this extent. The deficiency is made good by the first colostrum sucked, for the antigen can be detected in the blood of the calf within six hours. After the third day the antigen content of the colostrum falls, and if a newly-born calf be fed from the first on the later milk it does not get from it the antigen it lacks.

From what has been said it will appear that these researches are still largely tentative, and it is not yet clear to what conceptions they may ultimately lead. Several hypotheses have been reared, but practically the facts which stand out most clearly are the specific character of milk, the immense importance of maternal nursing, particularly during the first few days, and the remarkable deficiency in complement in some cases of malnutrition. Immunisation is one of our lines of defence against infections: some of Schlossmann's researches hint at the possibility of combating malnutrition and intolerance of milk in the same way.

Medical Education of Women in Edinburgh.

This question has again been brought prominently forward owing to the unfortunate position in which the Association for the Medical Education of Women has been placed by the sale of Minto House. This building has served for many years as the headquarters of the Association, and from its position and traditions was admirably adapted for the purpose. We sympathise with the Association in the unfortunate circumstances which have deprived it so unexpectedly of its home, but we fail to see why this fact should be magnified into a crisis as regards the medical education of women in Edinburgh.

It is well known that although in name called the Medical College for Women, yet comparatively few of the classes of the curriculum were held within its walls, and that its chief usefulness consisted in providing a central office and accommodation for the teaching of practical anatomy. The crisis therefore chiefly consists in replacing these wants, and we understand that suitable accommodation for the purpose was available and could have been obtained by the Association. If this course had been adopted, then the *status quo* as regards the medical education of women would have been maintained, and any so-called crisis obviated. For certain reasons, however, this course was not adopted by the Association, and it has appealed to the University Court to help them out of the difficulty by undertaking the education of the women students.

We do not desire to maintain the proposition that the position of the University in regard to women medical students is altogether satisfactory. The proper training of those upon whom it confers its degrees should be the necessary and obligatory complement of graduation. This is the ideal position, and one which Edinburgh University has always strongly advocated. In the case of women students, however, the position is not so simple when viewed from the standpoint of expediency and the best interests of the University. There are many reasons why it would be a most disastrous policy for the University to undertake the onus of teaching women medical students. In the first place, because, the example of other Schools notwithstanding, mixed classes would simply mean the death-knell of the Medical School, which has made the University famous and the largest seat of medical education in the Empire; and, secondly—it is necessary to be frank—because Edinburgh is at present in sore straits to provide the necessary material for the efficient teaching of practical anatomy, operative surgery, practical midwifery, as well as for clinical instruction in medicine and surgery.

The future of Edinburgh depends upon its male students—not the women; and unless this fact is recognised we shall be saddled with a burden which will effectually prevent the expansion of the class of student upon which the chief prosperity of the University depends, and also, it may be, which will lead to a serious difficulty in providing for the education of such numbers as we at present possess.

We have already stated that the Association has the opportunity of maintaining the *status quo*—to this course no one can take exception—but it has no cause to complain if, under the circumstances, the University feels itself unable to afford aid by undertaking the medical education of women. Such students form but a very small proportion of the medical undergraduates in Edinburgh, while not more than about a fifth of their total number are natives of the city. It cannot, therefore, be maintained that any great hardship is being inflicted on them as a body by the refusal of the University to admit them within its walls, more especially when it is remembered that, so near as Glasgow, there is not only a superabundance of clinical material available for them, but also no less a sum than £45,000 of the Muirhead Trust money lying ready to be devoted to the scientific education of women.

Sir Henry Littlejohn. FOR more than half a century Sir Henry Littlejohn has been one of the most outstanding figures on the Edinburgh stage, and, since the death of Sir Robert Christison, he has played the leading part. The announcement of his approaching retirement from the posts which he has filled with such acceptance, has accordingly attracted more than usual attention. It is not possible on this occasion to attempt an estimate of the enormous obligations under which he has laid the city of his birth and the country at large; we cannot, nevertheless, allow the opportunity to pass without some grateful acknowledgments of his invaluable services.

As Surgeon of Police for more than fifty years, and Medical Officer of Health for a period not much less, Sir Henry Littlejohn has been responsible for all the advances which have characterised Edinburgh during the second half of last century. The disappearance of smallpox and typhus fever, and the great diminution of most of the other infectious diseases, must be attributed to his energies. Nothing could be more striking in this connection than the reduction in the death-rate of Edinburgh, which, between 1850 and 1900, fell to about one-half. In association with William Chambers, he led the Town Council of Edinburgh to see the necessity for clearing out the old rookeries in which disease and crime were hatched, and let air and light into many a festering spot which had been unchanged since the times of Flodden. For these services the City of Edinburgh will ever hold Sir Henry Littlejohn in thankful remembrance. In medico-legal circles he has, since the death of Sir Robert Christison, been the most important man in Scotland, and has taken part in almost all the great criminal trials in his time. From the year 1855 until 1906, that is to say for fifty-one years, he taught the subject of Medical Jurisprudence in the Edinburgh Medical School. During the last ten years of this period he was the University Professor on the subject. No one has, within the memory of man, approached him as a teacher. His lectures were marked by lucid analysis of fact, by dramatic vividness of statement, and by picturesque grouping of surroundings. Among the many generations of medical and legal undergraduates who sat at his feet during his half a century of teaching, there is a unanimous opinion that he was without a rival as a teacher.

Sir Henry Littlejohn will be followed into his retirement by the good wishes of all his fellow-citizens, and his friends trust that he will long continue to enjoy that perennial youthfulness which has been envied by all. A hope has often been expressed, and we may venture here to echo it, that he would spend some of his well-earned leisure in giving permanent form to his reminiscences. Permeated as he is with the old traditions of our picturesque city, he would be able to rescue from oblivion many an interesting chapter in history.

Dr. Halliday Douglas, a former President of the Royal College of Physicians, and for many years the Senior Fellow, passed away within a week of his eighty-ninth birthday. There can be few still with us who remember him as one of the Physicians to the Royal Infirmary, for he had actually completed his term of office in that institution before the outbreak of the Crimean War. His hospital service was not only remarkable in that he was appointed a full Physician at the age of twenty-four, but in respect of the important share which he took in popularising the use of the stethoscope, and in the perfection of its application to clinical medicine to which he himself attained. He was held in high esteem by his contemporaries, and in particular by Warburton Begbie, who often sought his help in difficult cases. That he did not acquire a large consulting practice was due in part to his retiring manner, which did not inspire confidence among those who did not know him, and in part to his being still a young man when his term of office in the Infirmary expired.

A man of many virtues and of a kind heart, he took a keen interest in the social and spiritual welfare of medical students, and was one of the founders of the Edinburgh Medical Missionary Society.

Reginald Harrison.

THE popularity of Reginald Harrison was not a thing of the town in which he lived or of the nation to which he belonged; it was world-wide. At gatherings at Paris or Berlin, Cairo or Washington, Harrison was one of the most popular representatives of British Surgery, and was beloved by all who experienced the charm of his personality. Until his short and fatal illness—influenza followed by pueumonia—and although on the verge of completing the allotted span of threescore years and ten, he was in full possession of his faculties and actively engaged in the multifarious duties of his busy life.

While he attained eminence as a general surgeon in the Royal Infirmary of Liverpool, his name is generally associated with the surgical disorders of the urinary organs, and on the death of Sir Henry Thompson he became the leading authority on this branch of surgery in the metropolis. Although belonging to what may be called the old school, his mind retained the plasticity of youth, and he kept himself well abreast of modern progress in a speciality which has made enormous strides in recent years. He was above all a courteous gentleman, and he will be sadly missed by a wide circle of friends in all parts of the world.

Electro-Therapeutic Section of the Royal Society of Medicine.

ON the recommendation of the Scottish members of the Electro-Therapeutic Section of the Royal Society of Medicine, the London Council has agreed to hold the May meeting of the Section in Glasgow, in the rooms of the Royal Philosophical Society, 207 Bath Street, on Friday, May 22, at 8.30 p.m. On that occasion three papers will be read—one by Dr. Lewis Jones of London, another by Dr. Dawson Turner of Edinburgh, and a third by Dr. Samuel Sloan of Glasgow. Many of the English members are expected to be present. Dr. Deane Butcher, the President of the Section, will preside. The meeting will be open to all medical gentlemen.

ORIGINAL COMMUNICATIONS.

OBSERVATIONS ON THE USE OF INOCULATIONS OF BACTERIAL SUSPENSIONS.[1]

By L. C. PEEL RITCHIE, Ch.M., M.D., F.R.C.S.Ed., *Clinical Assistant, Surgical Out-Patient Department, Royal Infirmary, and Research Student, University of Edinburgh.*

(*From the Surgical Out-Patient Department, Royal Infirmary, and University Surgical Laboratory, Edinburgh.*)

IMMUNITY against bacteria may be of various kinds, namely, antimicrobial, that induced by the receptors of the bacterial bodies themselves, and antitoxic, that induced by the soluble toxins produced by the bacteria and given off from them, or possibly also by those retained within them as endotoxins. The processes involved are essentially different, and at present we are concerned solely with the former, *i.e.* antimicrobial immunity. For its production we would wish to inject nothing of a toxic nature but the bacterial bodies with their contained receptors. The protoplasmic bacterial poisons (receptors) possess specificity within certain limits dependent on their stereochemical structure which is sometimes easily upset by physical and chemical means. In practice the bacteria from cultures are first killed, usually by heat, washed, and injected in suspension in a neutral fluid.

If one introduces a minute quantity of poisonous bacteria into the system, the organs react to protect themselves, the reaction is enormously out of proportion to what is required to neutralise the poison introduced, and the protective substances formed are therefore available for combating existing disease or guarding against future infection of the same nature. It is important to realise fully that one is not introducing into the patient's system a dose of a ready-formed protective or anti-substance or serum, for one is relying on the patient's immunising reaction to produce this for himself, and if he were unable to do so, such treatment would be unjustifiable.

One may naturally wonder why such inoculation can be beneficial in the presence of an infective disease. The reason is to be found in the observed facts that nature tends to control infective processes as far as possible by localising them and preventing their extension to the general circulation and distant organs. In this work first the leucocytes, later the fixed tissue cells, play the part of the limiting agents, with the result that where the local reaction is efficient the organisms are early shut off from the circulation, and sufficient general stimulus is apparently wanting. The tendency later is to throw out the infective agents from the body, and so we have in some instances the rupture of abscesses and the formation of granulation tissue, which presents an excreting, not an absorbing surface.

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[1] A paper read before the Edinburgh Medico-Chirurgical Society, March 4, 1908.

If the barriers are incomplete, then the stimulus reaches the body circulation, and in such cases inoculation may be superfluous if not actually prejudicial.

In purely localised cases we can produce and increase by inoculation the quantity of specific antibacterial substances in the circulating blood plasma. The local lesion is benefited in direct proportion as this plasma reaches the organisms and injures them or prepares them for phagocytosis. A marked positive chemiotaxis is induced, attended probably with increase of local inflammatory reaction. At any rate one finds that where suppuration has already developed, it tends to be augmented for a time and to terminate more rapidly. If a discharging lesion such as an open abscess is present, the effects can be demonstrated by microscopical examination of the pus. Before inoculation one finds perhaps organisms in quantity lying free but rarely within the leucocytes, after inoculation but few extracellular organisms and many leucocytes packed with them. When suppuration is concealed at first, the pus when evacuated is not infrequently sterile. The blood plasma after inoculation is seemingly able to supply just that needful help to the leucocytes which are no doubt poisoned by the products of bacterial growth, those non-specific toxic substances such as the tox-albumins common to all organisms causing suppuration, and the outcome is that the tissues finally gain control of the situation.

This is the typical sequence of events in lesions due to the bacteria of acute suppurative infections. With others, *e.g.*, tubercle, however, the case is different, where the resulting lesion is a very chronic one, and so formed that the bacteria may be immured in it and cut off from reach of blood and lymph. Inoculation here has probably little effect directly on the bacteria, but if the blood is rich in protective substances, extension of the disease is unlikely, for any bacilli escaping from their confines are bathed in this fluid, and phagocytosis is actively induced. If we can control the extension of any chronic disease, we are doing a great deal of good to the patient, and usually local factors will in the end eliminate the local infection. In the very nature of things, then, inoculation treatment in such conditions as tubercle is less striking in its results, but hardly less valuable. Of course the logical endeavour in inoculation treatment is to increase as far as possible the circulation of the immunising plasma through the diseased area. Accordingly heat, and appliances for producing hyperæmia, are of great value, and should be adopted where feasible.

Till recent times inoculation treatment was to a large extent empirical, and with doses given in regularly increasing amount and at regular frequent intervals, aimed at "accustoming" the patient by degrees to large quantities of the poisons from which he suffered, so that they in their turn should prove harmless. At first an obvious clinical reaction was aimed at, subsequently the aim has been to avoid this. In recent times, Wright and his school have combated this method of treatment, claiming that the real object is to increase the protective substances in the blood of the patient, and that this must be controlled by the observation of his phagocytic index.

I must here digress to refer briefly to the effects of inoculation as shown by a study of the index. If a dose of a bacterial suspension within therapeutic limits is given to a healthy person, the result is a rise in the index, usually showing itself at the end of twenty-four hours, then progressively increasing for a variable period, and lasting altogether for several weeks. In an infected person this rise or "positive phase" is preceded by a temporary fall or "negative phase" (see Chart 1). What is not so generally known is that if the index is observed at short intervals within the first twenty-four hours a very marked rise occurs, usually attaining its climax in about six hours, and this is a feature common both to healthy and to infected persons' bloods (see Chart 2). This observation is of importance as showing that the infected person is not less capable of rapidly elaborating immune substances.

Wright and his school insist on the importance of avoiding giving an inoculation during a negative phase or period of supposedly diminished resistance on account of the risk of producing a cumulation of negative phases, and consequently abolishing the powers of resistance. This was observed by Wright to occur with regard to the *agglutinins* to *B. tuberculosis* in the blood of a patient treated by frequent inoculations of tuberculin, whose agglutinative power fell to zero. He apparently assumed that the same would occur in respect of the phagocytic index, but so far as I know it has not been actually tested and reported on. My own observations do not bear this out. It is on this assumption, however, that his method of controlling inoculation treatment is based. It should be realised that the phagocytic index represents only a limited phase of immunity, and that proof is wanting as to the prejudicial significance of the negative phase as such.

Phagocytic index estimations to my mind have proved their greatest value in showing how small a dose of a suspension is necessary to produce a marked immunising effect, in showing how long such effects may persist, and in showing the fallacy of the frequent use of inoculations, for it is found impossible to call forth a progressively cumulative and lasting positive phase in a patient's blood. If this is attempted, one finds after a number of inoculations, each given while the index is still high, that a negative phase may occur, which is much prolonged and may last for weeks.

On the other hand, I have found that with a suitable dose, if each successive one is giving only as the effects of the previous one are passing off, the treatment may be continued for months or years without incurring the risk, if such it is, of a prolonged negative phase. In this procedure the index, without perhaps reaching any great height, is maintained very steadily above normal. If we can secure this we shall probably succeed in preventing any extension of disease in those very chronic cases which demand long-continued treatment. My experience has convinced me that the practical results are as satisfactory and in the long run more so than if one aims at a supposedly more rapid method of immunisation. Nor is there probably any real advantage in attaining a very high index, as that only demonstrates the presence of phagocytic immune substances in the circulating blood in great excess of what are absorbed by the disease focus, which are therefore superfluous.

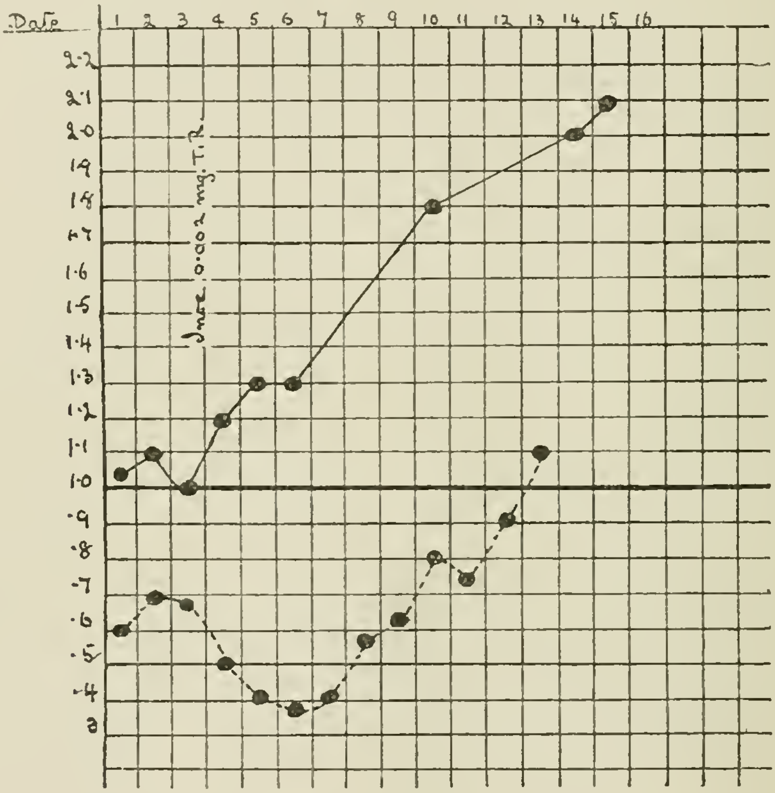

CHART 1.—Showing effects on day-to-day indices of a healthy and an infected person after inoculation. The healthy person's blood (continuous line) shows an immediate positive phase; the infected person's blood (dotted line) shows a preceding negative phase.

Except in the case of tuberculin, it has been the custom to measure bacterial suspensions in terms of the number of organisms contained. This precludes any comparison of dosage of different bacteria. It has been my practice to prepare all suspensions by weight, and measure their dosage in terms of the weight of washed and dried bacterial bodies contained per c.c. This corresponds to the description of dosage in Koch's "new" tuberculin preparations. The result has been that one could compare the dosage of different bacteria, and I have satisfied myself that doses approximately equal of all bacteria are correspondingly efficacious. It is generally held that a dose of Tuberculin-R. need not exceed $\frac{1}{1000}$ mgrm., while a dose of 1000 million staphylococci which weigh as much as $\frac{1}{10}$ mgrm. is considered quite an average dose, though weight for weight a hundred times that of the tubercle bacilli. A dose of $\frac{1}{1000}$ mgrm. is an amount which I have not found it necessary to exceed with any bacterium with which I have worked, and the results are as satisfactory, I believe, as with hundred times larger doses commonly given.

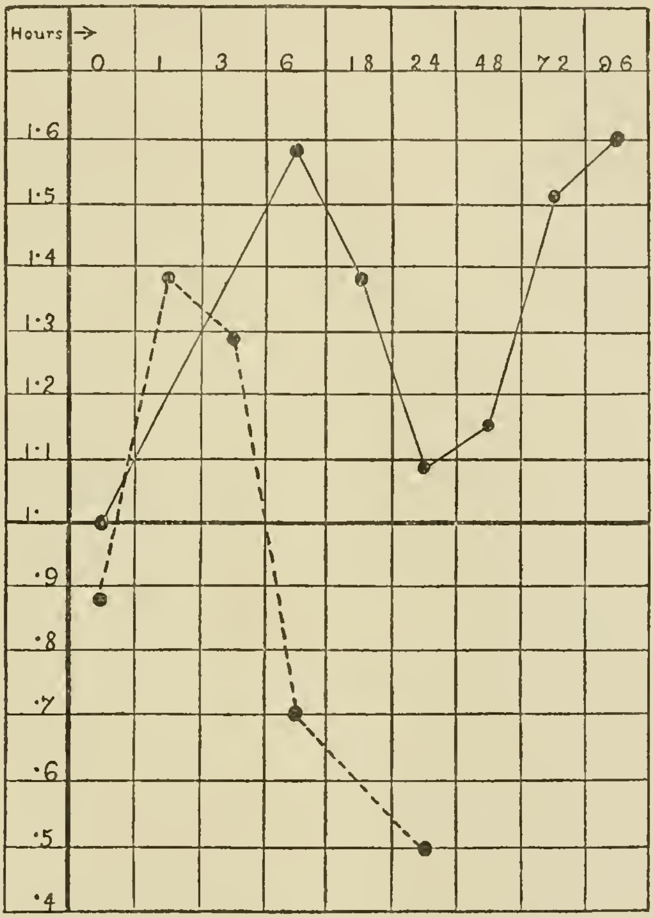

Chart 2.—Showing early effects on indices of a healthy and an infected person after inoculation. The bloods both of the healthy person (continuous line) and the infected person (dotted line) show a marked positive phase within six hours. At the end of twenty-four hours, however, the position corresponds to that shown in Chart 1.

An objection that might be raised to this method of weighing bacteria for suspensions is the larger quantity required and the consequent delay if prepared from the patient's own bacterium. This is held to be necessary in many infections, typically streptococcal ones, the idea being probably based on the supposed necessity of producing polyvalency in antistreptococcal serum preparation. This is quite contrary to my own experience, as I have not found any infection fail to beneficially respond to the use of a stock suspension.

But in order to obtain a bacterial suspension which is in itself equi-valent, certain points must be observed in its preparation. The bacteria must be freshly isolated from a source of active infection, the cultures must be young and grown on the most suitable media, and subcultures should be avoided if possible. In short, the cultures must preserve the highest degree of potential pathogenicity. They are then washed entirely free from cultural by-products.

The proper intervals as indicated by following the phagocytic index would be found to vary to some extent at different times and in different individuals. We wish to anticipate the fall of the index below par, and we shall probably do this in every case by giving injections of suitable amount every four weeks. That is perhaps oftener than every case would require, but we need not fear doing harm.

A few cases show a markedly persistent negative phase after a first inoculation. This is possibly due to a somewhat obscure feature of immunisation known as hyper-susceptibility. It is overcome, and a positive phase produced by giving another inoculation without further delay. I therefore feel inclined to recommend giving two or three inoculations close together at the beginning of treatment. A simple scheme then for treating a chronic condition in an adult would be to give doses of $\frac{1}{1000}$ mrgm. at intervals of two, then three, then four weeks, continuing at that rate for six months. Later, probably, it is not necessary to inoculate oftener than once in six weeks, and finally perhaps in two months. But this later treatment must depend on the clinical condition and the extent of recovery. Without exception, inoculations in chronic affections, typically tubercle, should be continued long after recovery is assumed, to prevent relapses.

In children under 14 the dose is reduced to one-half, and progressively with diminishing age, so that the dose for infants is perhaps one-tenth.

More acute conditions demand smaller dosage, and where prolonged treatment is not anticipated, inoculations may with advantage be given at shorter intervals, so as rapidly to bring the patient under the greatest possible influence of the drug. For example, in acute infections a dose of $\frac{1}{4000}$ to $\frac{1}{2000}$ mgrm. is given and repeated in five to ten days.

I have treated now very numerous cases on these lines, and the results have been quite satisfactory. The guiding rule should be kept in mind that when in doubt it is better to withhold than to give an inoculation.

As regards the method of administration, I have found the left triceps about 2 to 3 in. above the tip of the olecranon, the most suitable site for injection. The suspension is injected direct into the muscle. It should be made up with normal saline, glycerine being avoided, and after the initial sterilisation preserved by the addition of a few drops of chloroform. Given in this way no discomfort ensues after inoculation.

It would be impossible for me here to review in detail the whole scope of inoculation treatment. I shall confine myself to a few remarks on the conditions with which I happen to have had most experience.

Firstly, with regard to *tubercle.* Most surgical affections are of the localised chronic type. If fever is present, in the absence of mixed infection, it is an indication of absorption from the disease focus, and rest is necessary till it subsides. The case is then treated as a localised one. Mixed infection demands treatment with the infecting organisms as well as with tuberculin. The rapidity of improvement is then often surprising.

Gland affections show very variable results, depending on the stage of disease. Very early cases do well. Caseating glands are very slow of absorption, and only time will accomplish this. Operation is often advisable, then, to hasten complete recovery. Rapidly breaking down glands often do particularly well, and usually require only puncture, repeated if need be, to evacuate the fluid. Periadenitis rapidly disappears with two or three injections, and leaves the glands becoming small and firm and much better suited for operative treatment.

Bone and joint cases give excellent results if not too far advanced. Infected joints, if got early, may recover with no loss of mobility. In any case restriction of movement may be less rigidly or continuously applied under tuberculin control, and while recovery with mobility is so important in the upper limb, this may also be aimed at in the lower. Discharging sinuses, if not actually leading to sequestra, can as a rule be got to heal, but mixed infection must be treated if present.

Skin conditions are specially intractable unless tuberculin is combined with suitable local measures. Here especially, as in most tuberculous affections, congestive treatment is of value.

We are all familiar with the cases of multiple infection, such as those patients "eaten up with tubercle" who haunt the out-patient departments of hospitals. A study of many such cases has led me reluctantly to the conclusion that too frequently operative procedures have been but the starting-point for a fresh extension of infection. In some instances, indeed, one has found that each operation has been regularly succeeded by a new appearance of tubercle elsewhere. Here we have a suitable field for the prophylactic use of tuberculin. So convinced have I become of this risk of extension, which, though not by any means the rule, cannot well be foreseen, that I would not readily bring myself to operate on a case of tubercle which had not been "protected" by a preliminary series of tuberculin injections.

The possibility of a certain number of cases of tuberculosis being due to bovine tubercle, as I have shown elsewhere,[1] must be kept in view, and before carrying out any prolonged treatment, one of the diagnostic methods which have been published from the University Surgical Laboratory[2] may be employed, and the patient then treated with a suspension of the human or the bovine type of bacillus, as determined by the blood examination.

The general surroundings and mode of life of the patient call for most careful attention, for if not favourable it is probably not advisable to use tuberculin.

Staphylococcal infections, so common in surgical work, offer a large field for treatment. Abscess formation may be prevented in the early stages. If already developed, healing is greatly hastened. Boils, a frequent cause of much suffering, can be aborted. If a slough has already formed, it usually separates in two to four days after inoculation, and healing follows as rapidly. Relief of pain is very prompt with a suitably small dose. Recurrent crops of boils can be entirely obviated once treatment is carried out, but this should be prolonged after recovery when the condition is a chronic one. Acne is similarly amenable to inoculation, but as the inflammatory condition is only secondary, the primary skin affection must certainly not be neglected.

In streptococcal infections I have seen more strikingly good results than in any others. Streptococci are responsible for most diverse types of disease, highly acute or intractably chronic. All are amenable to treatment. Using a single stock suspension prepared from a case of wound infection, I am the more surprised at my uniformly good results, for it is generally claimed that streptococci for injection must be prepared from the individual patient. Such has certainly not been my experience. Acute lymphangitis, wound infections, chronic sinuses, erysipelas, have all yielded equally well to the one preparation. This is a fact of some importance, as many streptococcal infections spread so rapidly that time is not given for the preparation of a suspension. Acute lymphangitis spreading up a limb, if treated early, is usually gone in twenty-four hours. Pain is relieved in a few hours, often completely in six; the accompanying malaise passes off at the same time, and the patient probably obtains an undisturbed night's rest. This course of events I have seen time and again, and it is not influenced by omitting local treatment. It is specially interesting as showing how the clinical condition corresponds to the early high positive phase which I have shown you on Chart 2. As an instance of an opposite type of case, I may mention a 6 in. long, chronic sinus following on empyema, infected with streptococcus, which reopened and discharged for six months, till after a single inoculation it healed permanently in less than a fortnight.

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[1] Ritchie, *Brit. Med. Journ.*, London, 1907, November 16, vol. ii.

[2] Stewart and Ritchie, *Edin. Med. Journ.*, 1907, May. Ritchie, *loc. cit.*

I do not propose to refer to other infections in which inoculation treatment has been tried and proved successful. Suffice it to say that the general principles stated are equally applicable to them.

Finally, I wish to refer to the prophylactic use of bacterial inoculations. From my previous remarks you will understand how one can assume the prophylactic action of immunising substances to be more efficacious than the curative. In the case of such a non-vascular lesion as a tubercle, treatment is essentially prophylactic; we guard against extension, and leave largely to local processes the final extinction of the disease.

But prophylactic treatment in the ordinary sense of anticipating infection has enormous possibilities. Here, however, we are faced with the difficulty of not always knowing what organisms we shall wish to be able to combat. The difficulty in the case of wounds, operative or accidental, is more apparent than real. If we give a dose of $\frac{1}{4000}$ to $\frac{1}{1000}$ mgrm. each of *Staphylococcus aureus* and *Streptococcus pyogenes,* and also of *Bacterium coli* if in the region of a mucous tract, we shall probably cover most eventualities, for other infections are usually secondary. I give such an inoculation in all operation cases, with so far uniformly satisfactory results. In accident wounds, too, we can similarly control if not entirely prevent suppuration. The early positive phase occurring within the first few hours, and the absence of subsequent negative phase in healthy persons, as already mentioned, furnish the justification for such inoculations given at the time of operation or soon after an accident, as any growth of bacteria in the wound is met by a blood fluid already rich in protective substances.

Numerous cases have been treated thus prophylactically in the Surgical Out-Patient Department of the Royal Infirmary, and it has proved very valuable in aiding the conservative treatment of lacerated wounds, in primary skin grafting, and generally in all cases where complete wound disinfection is difficult to ensure.

It should be noted that if this method is employed, the use of chemical antiseptics in the tissues is contra-indicated, as these inhibit phagocytosis which is the means of final disinfection on which we are relying after the necessary mechanical cleansing.

I have pleasure in once more recording my thanks to Professor Chiene for the facilities accorded me in his Laboratory for the experimental work on which these observations are based, and I would likewise gratefully acknowledge the kindness of the surgeons in charge of the Surgical Out-Patient Department of the Infirmary, who have so generously afforded me the opportunities for the study of inoculation treatment.

DIVERTICULA OF THE ALIMENTARY TRACT, WITH PARTICULAR REFERENCE TO THOSE MET WITH IN THE ILEUM RESULTING FROM AN ACCESSORY PANCREAS AND FROM TUBERCULOSIS.[1]

By Alexis Thomson, F.R.C.S.Ed., *Assistant-Surgeon, Edinburgh Royal Infirmary.*

(Plates III. and IV.)

Diverticula or pouchings are met with in relation to so many of the tubular and saccular structures of the body, that their consideration would lead me far beyond the limits of the present occasion were I not to restrict myself to those connected with the alimentary tract. Diverticula are met with almost throughout its whole length, but occur with varying frequency in the different parts of the digestive tube. They are, for example, comparatively common in the pharynx, gullet, lower part of the ileum, and in the sigmoid colon; they are comparatively rare in the stomach, duodenum, jejunum, vermiform appendix, and in the rectum; so far as I am aware, their occurrence in the cæcum or ascending colon has not been noted. It was formerly the custom to speak of true diverticula, which consists of a pouching of all the coats of the digestive tube, and of false diverticula, in which the mucosa and serosa are pouched through a gap or defect in the muscularis. The demonstration of acquired pouches in which all the coats are represented has made this distinction invalid, and we now speak of *congenital diverticula*, in which the protrusion depends on the persistence of fœtal structures such as the visceral arches or the Vitelline duct, and of *acquired diverticula*, in which the chief etiological factor is any condition that impairs the integrity of the muscular coat of the digestive tube.

Diverticula of the pharynx and œsophagus are comparatively common. Those springing from the pharyngeal wall take origin from the inner portion of the second visceral cleft and open in the immediate vicinity of the tonsil. In the unique specimen described by Morrison Watson, to which my attention was directed by Professor Cunningham, the inner opening was situated behind the tonsil, while the lower blind expanded extremity reached down to the episternal notch; its wall did not contain any circular muscular fibres, but possessed a single layer of striped fibres arranged parallel to the long axis of the tube.

A much more common seat is *at the junction of the pharynx with the œsophagus*, where there is an anatomical weakness due to the divergence of the longitudinal muscular fibres, which run forwards as they ascend in the shape of two lateral bands to become attached to the cricoid cartilage. The weakness is most

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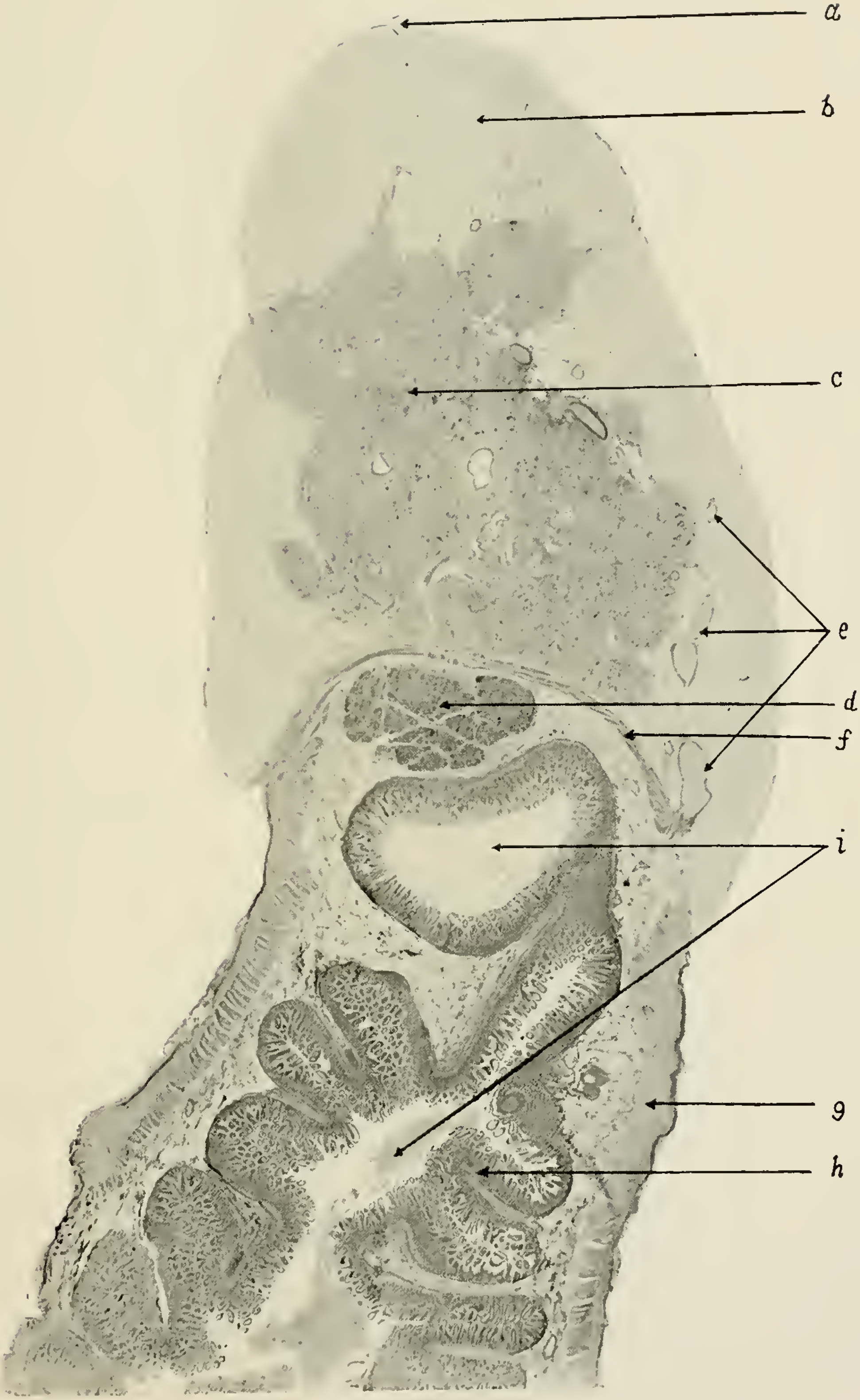
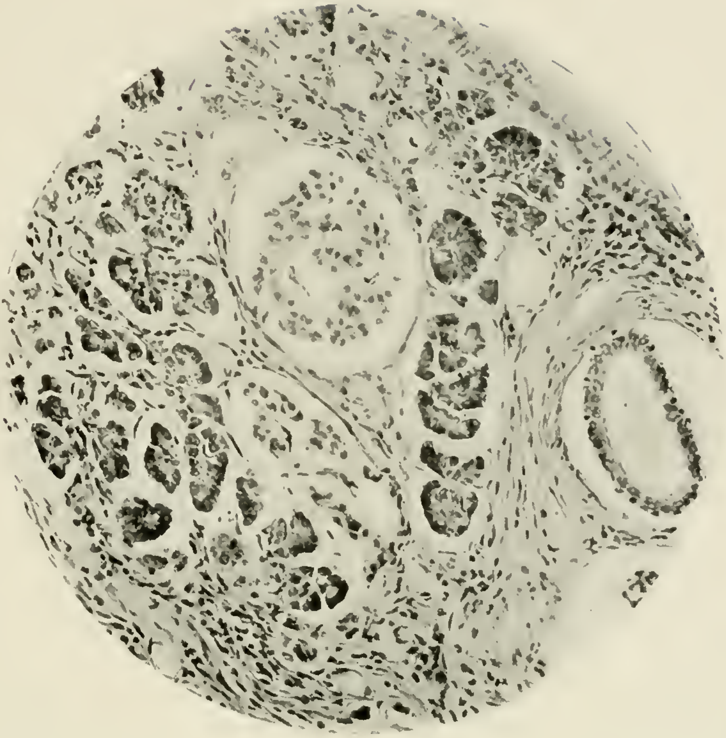
[1] A paper read before the Medico-Chirurgical Society of Edinburgh, March 4, 1908.

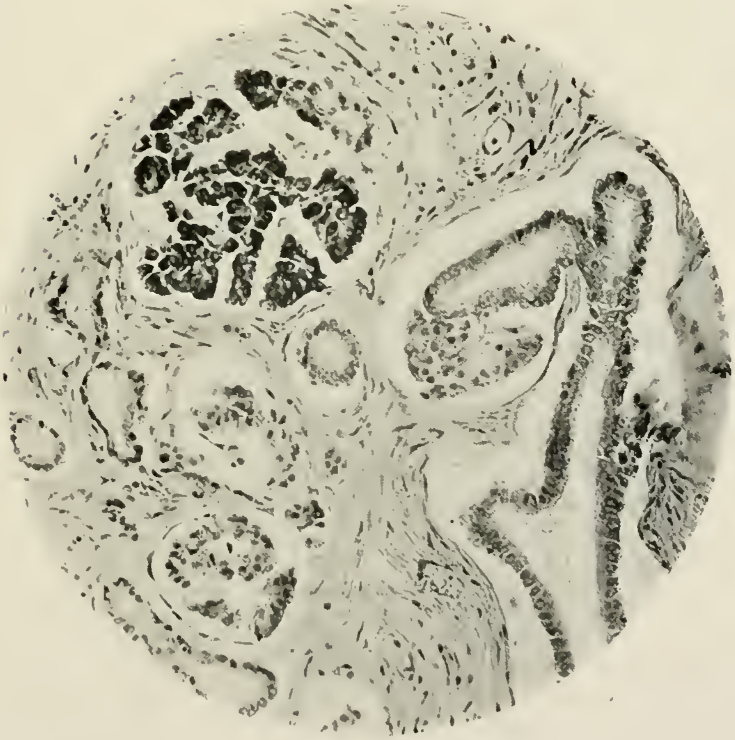


Complete Longitudinal Section of Diverticulum with Accessory Pancreas. × 5.

a, Extreme apex of diverticulum; *b*, Fat; *c*, Larger portion of accessory pancreas embedded in extraperitoneal fat; *d*, Smaller portion of accessory pancreas; *e*, Blood-vessels; *f*, Longitudinal muscle fibres of coat of bowel; *g*, Circular muscle fibres; *h*, Mucosa with villi and solitary glands; *i*, Lumen of diverticulum.



Portion of accessory pancreas. × 150. Showing isolated remains of pancreatic acini; alveoli filled with epithelial cells. ? Cancer.



Portion of accessory pancreas. × 150. Showing proliferative changes in ducts, replacement of pancreatic acini, alveolar spaces filled with epithelial cells, increase in stroma.

marked in the middle line posteriorly, where the majority of the so-called "*pressure pouches*" occur, but the weakness also affects, although to a less extent, the lateral walls of the gullet in this situation. There is a characteristic example of a pouch at this level springing from the left lateral wall of the tube, in the St. Thomas's Hospital Museum, London. Butlin, who was one of the first in this country to write on these pouches, referred to the absence of muscle fibres in the wall of the pouch observed by him, and to the extraordinary elasticity of the pouch, so that it could be easily distended to two or three times its natural size.

Diverticula of the gullet resulting from defects in the muscular coat are met with at *other parts of the tube*, and of this I am able to show an instructive example. It is a pouch about the size and shape of an ordinary thimble, projecting from the right antero-lateral aspect, at the junction of the middle and lower thirds of the thoracic œsophagus. The wall of the pouch is entirely deficient in muscular fibres, and so thin as to be translucent. The entire gullet when laid open and held up to the light shows numerous irregular areas, in which the muscular coat is abnormally thin. This specimen was obtained from the body of a man, æt. 70, a confirmed drinker, who succumbed to pulmonary emphysema and cirrhotic kidneys.

Another site of œsophageal diverticula is in the *region of the bifurcation of the trachea* and crossing of the left bronchus; these have been described as "*traction diverticula*," because they were supposed to result from the contraction of cicatricial tissue formed in relation to disease of the adjacent lymphatic glands. They are believed, however, by Ribbert[1] to be the result of a congenital defect in the muscular coat arising at the time of separation of the air passage from the gullet.

Pouches which form in the process of encystment of a *foreign body* which has been impacted in the œsophagus may form at any part of the tube, as they are known to form, from a similar cause, in other parts of the alimentary tract, as a result of the weakening of the muscular tissue by inflammatory changes.

In the stomach, diverticula are so rare as to be of little or no clinical importance. A few specimens are recorded, in which the stomach has presented one or more congenital pouchings which have been compared to the compartments of the stomach met with in ruminants. The only other instances recorded are those of minute diverticula in the vicinity of the pylorus associated with the presence of an accessory pancreas.

In the duodenum, diverticula are also rare, and would appear to have only an anatomical interest. My attention was directed to them by Professor Cunningham. Two varieties are met with. The first resembles those which occur in the stomach in relation to an accessory pancreas. In the second, a pouch about the size of a pigeon's egg or a walnut springs from the median side of the gut a little above the ampulla of Vater. In the cases described by Rolleston and by Targett, the sac, which was embedded in the substance of the pancreas, was devoid of muscle fibres. In view of their situation in the vicinity of the diverticula which are concerned in the formation of the liver and pancreas, it is believed they owe their origin to the persistence of supernumerary pouches formed early in fœtal life. C. M. Jackson describes a duodenal pouch found in the body of a man, æt. 50, springing from the upper edge of the transverse portion of the duodenum, and possessed of a rudimentary muscular coat, which would appear to have had a similar origin to those described by Rolleston and Targett.

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[1] *Virchow's Archiv*, Bd. clxxviii.

In the jejunum. Although the jejunum is not infrequently the seat of an accessory pancreas, I have not seen the record of one which was associated with a diverticulum. Multiple small acquired diverticula are stated to have been met with by Hansemann,[1] as many as four hundred being counted in the jejunum, ileum, and sigmoid.

Before considering those met with in the lower part of the ileum which form the main subject of this paper, I shall briefly refer to those met with in the remaining portions of the alimentary tract.

Diverticula are not infrequently found *in the appendix vermiformis* when operating for recurrent appendicitis. They were made the subject of an interesting article by v. Brunn some three years ago. I have met with two examples in 130 cases. The muscular coat is destroyed or replaced by granulation or scar tissue at one point, and the mucous membrane, with what remains of the other coats, is herniated through and forms either a small pouch or a cylindrical diverticulum lying parallel to the appendix and forming with it a structure resembling a double-barrelled gun. Clinically they are associated with recurrence of attacks at frequent intervals, and the operation for the removal of the appendix is usually a difficult one on account of the extent of the adhesions.

Acquired diverticula are commonly met with *in the descending colon and sigmoid.* They are usually multiple, of a minute tubular character, and apparently result from the protrusion of the mucous membrane through defects in the circular muscular coat. The most complete description of these I have been able to find is by Dr. L. B. Wilson in a paper by William J. Mayo.[2] All the diverticula are described as being small, with atrophied mucosa, thickened submucosa, and no muscular coat. Examination of the circular muscular coat of the sigmoid in the vicinity of the diverticula showed areas of irregular thinning, in which the muscular fibres seemed to be entirely absent. Wilson points out that their hernial nature was further shown by the fact that all had penetrated the haustra of the sigmoid well away from the teniæ of the longitudinal muscularis. It would appear to be uncertain whether the deficiency of the circular muscular fibres is congenital or the result of atrophy from the pressure of hardened fæces.

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[1] Quoted by Nothnagel. Reference not given.

[2] "Acquired Diverticulitis of the Large Intestine."

Diverticula of the sigmoid and descending colon undergo pathological changes more frequently than those met with in other parts of the intestinal tract, because of the difference in the character of the bowel contents. The most important clinical conditions associated with these diverticula are inflammatory troubles in the left iliac region, often closely simulating appendicitis, and, like this, terminating in localised abscess or in diffuse forms of peritonitis. In another group of cases there results an inflammatory thickening of the sigmoid associated with narrowing of the gut and the recognition of a tumour in the left iliac fossa, which is liable to be mistaken for malignant disease. In some cases the formation of an abscess has resulted in the production of fistulous communications with the bladder.

True diverticula of *the rectum* are extremely rare; only a few instances are recorded, and with such meagreness of detail that one is not warranted in drawing conclusions from them, except that they appear to owe their origin to errors in development.

Diverticula of the ileum.—In studying diverticula of the lower ileum, it is necessary at the outset to make an attempt to differentiate the congenital form which is associated with the name of Meckel from the acquired varieties. Meckel's diverticulum, when of the "finger-of-a-glove" type and lying free in the peritoneal cavity, can usually be distinguished from the acquired forms by its frequently possessing a mesentery, by its containing all the coats represented in the normal ileum, and by the absence of any lesion at its free extremity capable of giving rise to a pouching of the bowel such as is so constantly found in acquired diverticula. If a Meckel's diverticulum is the seat of disease, the latter is secondary and not the cause of the protrusion. That it always springs from the bowel opposite the attachment of the mesentery cannot be relied upon in the differentiation from acquired diverticula, for there can be no doubt that the latter may present a similar relationship, and there is as little doubt that an acquired diverticulum may be solitary.

The occurrence of acquired diverticula of the "finger-of-a-glove" type has only recently been admitted. A cursory glance at the literature reveals the fact that these have been frequently mistaken for the Meckel variety, and have been recorded as such; the error is excusable, for the resemblance is remarkable. The observation in the ileum of two diverticula, only one of which could be a "Meckel," was an important factor in its correction, and various stages in the formation of the acquired diverticle were then observed. It has been my good fortune to meet with two examples which, to my mind, go far to confirm the accuracy of the view that many diverticula of the "finger-of-a-glove" type are of the acquired variety.

CASE 1.—*Acquired diverticulum of lower ileum due to a localised tuberculosis of the wall of the bowel.*—This specimen was removed in the course of a laparotomy from a woman, æt. 65 (seen in consultation with Dr. Hope Fowler), who had had threatenings of intestinal obstruction, with recurrent colicky pains referred to the lower part of the abdomen on the right side. On opening the abdomen, some attenuated adhesions were found between the cæcum and the anterior abdominal wall, and between the different coils of the lower ileum. The cæcum, appendix, and the glands in the adjacent mesentery were normal. On pulling out the lower ileum, several coils were encountered, the loops of which were approximated by attenuated adhesions, and about 2 ft. from the lower end of the ileum a diverticulum was found about the size of the little finger and about 1 in. in length, springing from the bowel midway between the mesenteric attachment and the border opposite to this; in consistence it felt remarkably solid, as if there was a growth in its walls. It was removed in the ordinary way with the appendix crusher, and the gap closed by a purse-string suture. She made an uneventful recovery, and is now, after an interval of five months, in good health.

Sections of the diverticulum were made, and showed the following appearances: Towards the free extremity, there are a number of rounded foci of giant-celled tuberculosis scattered irregularly through the different coats of the bowel. Those in the deeper layers of the mucous coat and in the submucous coat appear to be the oldest. There are several in the muscular coat, and at one point these had completely destroyed and replaced the circular muscularis. There are a number in the subperitoneal tissue, these having evidently disseminated by way of the lymphatics. The tuberculous foci show a large number of typical giant cells and a considerable degree of central necrosis, while in their vicinity the vascularity is greatly increased, and there is little fibrous tissue, so that one feels justified in concluding that the tuberculous lesion, although of the chronic variety, was not of very long standing, and that it was progressive. It would also appear that the tuberculous infection had extended from the lumen of the intestine outwards, and that the spread of the infection to the peritoneal coat was responsible for the formation of the adhesions observed in the vicinity of the cæcum and cæcal segment of the ileum. It seems reasonable to ascribe the threatenings of obstruction and colicky pains to the presence of the diverticulum and to the adhesions in its neighbourhood, these exciting irregular and exaggerated peristaltic movements.

It is undeniable that it is very rare to have tuberculosis limited to so small a segment of the ileum alone, but it is my opinion that the tuberculous lesion was the primary one, and that by its destructive effects on the circular muscular coat it had caused the pouching of the bowel described.

Case 2.—*Acquired diverticulum of lower ileum with accessory pancreas, causing symptoms mistaken for those of acute appendicitis.*—The patient from whom this specimen was removed was a stout man, æt. 33, a grocer, seen in consultation with Dr. Dickie on 2nd March 1905. The history showed that two years before he had had an attack attended with abdominal pain, shivering, and vomiting, regarded by his doctor as appendicitis. The present attack began suddenly on the afternoon of the 2nd March 1905, with shivering, inability for food, pain referred to the umbilicus, and vomiting; after much straining he passed a small motion mixed with blood. These symptoms passed off after being put to bed, but on the evening of the following day the pain returned, the temperature rose to 103°, there were pain and tenderness in the right iliac fossa, and the bowels moved twice. The loading of the abdominal wall with fat rendered the examination difficult, but there was sufficient tenderness and impairment of respiratory movement in the right lower quadrant to lead to our making a provisional diagnosis of peritonitis, probably originating from the appendix, and he was removed to a nursing home for operation.

On opening the peritoneal cavity—thirty-four hours after the first onset of symptoms—a small amount of clear serum escaped. The appendix did not show signs of recent inflammation, but, as it was bound down about its middle and likely to give trouble in the future, it was removed. The lower coils of ileum were then pulled out at the wound, and, about 18 in. from the ileo-cæcal valve, a diverticulum was found of the "finger-of-a-glove" type, presenting a bulbous enlargement, resembling in shape the glans penis. Its peritoneal coat showed a thin deposit of fibrin but no undue vascularity; it was removed by the same method as is employed for the removal of the appendix. Further exploration of the abdomen yielded negative results, and the wound was closed without drainage. He made an uneventful recovery. Three years have now elapsed since the operation, and he has had no return of the abdominal symptoms. His health has been excellent, and although thinner than formerly, he has been able to undertake without difficulty the management of an exacting business.

The diverticulum in its contracted state (due to fixation in alcohol), measured 3 cms. in length; the tubular portion measured 1 cm. in diameter, while the club-shaped extremity measured 1·3 cm. The tubular portion presented the appearances of normal small intestine; the club-shaped portion appeared to be composed of fat; there was a shallow constriction intervening between the two portions.

On section, the club-shaped portion was seen to be solid and to constitute fully one-half of the entire diverticulum; its centre presented a lobulated appearance as if composed of gland tissue, while the cortex consisted of fat.

The relations of the diverticulum to the tumour at its apex are well seen in Plate III. At the distal end of the tubular portion, and confined within the longitudinal muscular coat, is a minute, well-defined mass of pancreatic tissue, the lobules of which are arranged as in the normal pancreas, and are provided with an average number of ducts. One of the peripherally placed lobules, however, shows a considerable increase in the amount of stroma and an increase in the number of the smaller ducts and of the medium-sized blood vessels. At the blind end of the tubular portion of the diverticulum, the circular muscular coat of the bowel is absent.

The larger mass of pancreatic tissue lies outside the muscular coat, and is embedded in extra-peritoneal fat; the latter, in its turn, is invested with a thin membrane derived from the serous covering of the bowel, and is provided with an excessive number of large, thin-walled blood vessels. The main mass of pancreatic tissue sends out irregular prolongations of its substance into the fat, and one of the prolongations extends so far as to become connected with the investing serous membrane. In the centre of the glandular mass is the section of a large duct, lined with columnar epithelium, and containing shed epithelium, nuclei of leucocytes, and threads and clumps of hyalin material. The epithelial lining of the duct is much subdivided, and appears to be engaged in growth like that observed in tubular adenomata. The size of this duct and of its branches is excessive, in proportion to the amount of gland tissue surrounding it. The lobules of gland tissue surrounding this centrally placed duct differ greatly in structure and arrangement from those of the normal gland. In many of the lobules there is an excessive amount of small ducts; in some of them this has extended to the almost complete replacement of the pancreatic acini, and gives the affected lobule the appearance of a tubular adenoma. This replacement of pancreatic parenchyma by newly formed ducts is widely distributed. Similarly widespread is the replacement of the pancreatic acini by solid masses of epithelial cells arranged in round or oval alveoli, presenting an arrangement of tissue elements resembling that of an alveolar cancer. Transition forms are also met with between the most minute of the newly formed ducts and the solid masses of the cells, which give the cancerous appearance to the parts thus affected. It is not possible to identify any islands of Langerhans, although it must be confessed that the appearance of islands is closely simulated by those alveoli which are filled up with what we are inclined to regard as cancer cells. The resemblance to islands is increased by the existence of capillary blood vessels and of a delicate stroma between the epithelial cells.

The extent of replacement of pancreatic acini varies in the different lobules. In some they are fairly well preserved; in the majority they have to a large extent disappeared. Under higher magnification the process of destruction and replacement of the normal gland acini by newly formed ducts and by alveoli filled with epithelial cells can be distinctly traced (Plate IV.).

The stroma shows a great departure from the arrangement and structure of the normal pancreas. It is greatly increased in amount, so that the lobules and acini are widely separated from one another, and it bears an excessive number of large blood vessels possessing walls of considerable thickness. In certain parts, especially around the proliferated ducts, the stroma is largely composed of an interlacing meshwork of smooth muscle fibres, cut in longitudinal and transverse sections. In other parts, and especially where the replacement of pancreatic acini is in active progress, it is richly permeated with small cells, these being here and there so abundant as to impart to the stroma the characters of granulation tissue; the latter is rich in capillary blood vessels, and may be observed to be replacing, by a process of eating up, the pancreatic gland tissue.

Near the junction of the tubular portion of the diverticulum with the solid bulbous extremity, and situated on the deepest part of the submucous coat, there are a few scattered masses of epithelial cells, which suggest a cancerous infection of the lymphatics.

Here, then, we have an accessory pancreas consisting of two portions—one, much the smaller of the two, included within the longitudinal muscular coat of the bowel, and retaining for the most part the characters of the normal pancreas; the other, much the larger, is embedded in subperitoneal fat, and presents changes of a complicated character. The most prominent of these changes are: An active proliferation of the duct epithelium, resulting in the formation of a large number of new tubes; a change in type of this proliferation, whereby the newly formed epithelial cells are collected into solid groups, and occupy spaces which come to resemble those of an alveolar cancer; an extensive replacement of the pancreatic glandular tissue by newly formed tubes, by alveoli filled with epithelial cells, and by a small-celled infiltration of the stroma; and, finally, a great increase in the amount of stroma and in the number of blood vessels, the stroma consisting in some lobules of interlacing bundles of smooth muscle fibres, in others of connective-tissue fibres, and in others again of a small-celled infiltration resembling granulation tissue.

It is difficult to focus all the inferences to be drawn from a study of the observations above recorded; but I shall attempt to discuss these under the headings of the clinical features, the nature of the diverticulum, and the interpretation of the changes in the accessory pancreas.

The clinical features.—Although the operation was undertaken on the understanding that the peritonitis proceeded from the appendix, a survey of the clinical features (*vide ante*) shows that they departed in some respects from those of appendicitis, while they resembled the features observed in cases of acute pancreatitis, not only in the attack which led to the operative interference, but in the milder attack which occurred two years before. Is it not possible that the changes which were taking place in the accessory pancreas led to alterations in the character of its secretion, and that this, unable to discharge into the intestine, escaped into the peritoneal cavity and caused the phenomena of peritonits? I am unable to explain the clinical features and the immunity from symptoms subsequent to the operation on any other hypothesis.

The nature of the diverticulum.—The fact that it was of the "finger-of-a-glove" type, and sprang from the ileum about 18 in. above the ileo-cæcal valve, would suggest that it owed its orgin to a persistence of the remains of the vitelline duct; I have no doubt, however, that it is an acquired diverticulum, resulting from the presence of the accessory pancreas. This structure consisted of two portions, one of which lay within the longitudinal muscle, and replaced the circular muscle at a point which ultimately became the apex of the protrusion, and it is by the yielding of the unsupported longitudinal muscle fibres to the pressure within the intestine that the protrusion was brought about.

The changes in the accessory pancreas.—It has been seen that these are of a complex nature. Certain of them, such as proliferation of the duct epithelium and multiplication of the ducts, increase in the amount of stroma with the appearance of interlacing bundles of non-striped muscle, are commonly observed in the accessory pancreas, wherever situated, and has led to their being described as cysts, adenomata, cyst-adenomata, adeno-myomata, and myomata in the wall of the stomach or intestine. I shall throw on the screen an accessory pancreas in the subcutaneous coat of the stomach from a man æt. 73, observed by my assistant, Dr. Graham, in which, side by side with normal pancreatic gland tissue, there are numbers of newly formed ducts closely resembling the arrangement of parts seen in tubular adenomata of the breast. I have also demonstrated in my own specimen the new formation in the stroma of smooth muscle similar to that in the muscular coat of the intestine, and either derived from this or from the muscular coat of the ducts. Thorel, who has investigated the origin of the muscular tissue in the stroma of the accessory pancreas, believes that they may arise from three different sources, namely—(1) The muscular fibres accompanying the larger ducts; (2) those in the walls of the blood vessels; and (3) from the fibres of the muscularis mucosæ.

A striking feature in my specimen of accessory pancreas is the evolution from the proliferated epithelium of the smaller ducts of what I am inclined to regard as an alveolar cancer, and this, so far as I am aware, has not been described before. It appears to me to be an observation of considerable interest, as shedding light on the anatomical beginnings of cancer, and as affording a remarkable illustration of Cohnheim's doctrine of the origin of tumour growths from embryonic residues.

ILLUSTRATIONS.

The plates are reproduced from photographs made by Mr. Richard Muir, assistant in the Department of Pathology, Edinburgh University.

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ELECTROLYSIS IN MEDICINE AND SURGERY.[1]

By DAWSON TURNER, B.A., M.D., F.R.C.P.Ed., F.R.S.E.,
Lecturer on Physics, Surgeons' Hall, Edinburgh.

TEN years ago electrolysis was chiefly practised for its destructive or coagulating power, *e.g.*, for nævi, removal of hairs, goitre, aneurysms, and strictures. Since that time the method has been much extended, and it is now used to introduce medicaments through the skin into the tissues by means of ions. Among the leaders of this new development are Edison, Leduc and his pupils, Gautier, etc. Fifty years ago, Benjamin W. Richardson had, however, endeavoured to produce local anæsthesia by the electrolytic introduction of aconite. Any attempts that were made in this direction in former times were classed generally under the heading cataphoresis, by which a bodily transfer of the electrolyte, usually in the direction of the current, was meant, but the ionic migration of the ions is of far more importance. Some knowledge of the physics of the process is required; only those medicaments which behave as electrolytes (which break up into ions) can be so introduced, *e.g.*, aqueous solutions of salts, acids, and bases. The particles of such a solution are believed to be more or less dissociated according to the dilution, and the electric current is carried through such solutions by the bodily movement of the ions; it is a convection current of electricity. Now the human body is an electrolyte, and electrical currents are only conveyed through it by the movements of ions; the body consists of various tissues bathed with an alkaline medium and surrounded by an insulator, the skin. The resistance of the skin can be diminished by thoroughly moistening it with an electrolyte, so as to afford an abundance of ions to carry the current, and by increasing the area of contact of the electrodes. The smaller the area of contact of the electrodes, the greater will be the current density, and the greater the discomfort felt by the patient. Suppose a person to place each hand in a separate basin of salt water, and suppose these are connected with the terminals of a source of electric supply, such as a battery or switchboard connected to the main; then at the anode or basin connected to the + pole, the body will lose its anions and receive cations, while at the cathode or basin connected to the − pole, the body will lose its cations and receive the anions. The anions are constituted by the acid radicals or elements, and the cations by the metallic radicals or metals. Thus oxygen, chlorine, sulphion, and hydroxyl are anions, while hydrogen, sodium, copper are cations. When sodium chloride is dissolved in water, its molecules dissociate into ions or particles with opposite electrical charges; the anions are charged − and will therefore be attracted to the anode and the cations are charged + and will be attracted to the − pole or cathode. Now in this case Na + is the cation and Cl − is the anion. At the anode the body will yield up chlorine and receive sodium, while at the cathode it will give up sodium and receive chlorine, for we may regard the tissues as principally bathed with NaCl. Between each electrode there will be a migration of ions, the Cl − ions will be moving to the anode and the Na + ions to the cathode. If a piece of raw beef be taken and electrodes be applied to either side of it with some blotting paper soaked in a solution of KI under the − electrode and some blotting paper soaked in starch between the + electrode and the beef, then if a current be passed, it will be found that the blotting paper at the + pole will shortly turn blue, showing that the iodine has been carried from the cathode to the anode through the beef. In one of the writer's experiments the blue reaction was obtained in twenty minutes, when the beef was $\frac{1}{8}$ in. thick, and a current of 50 milliampères was maintained. Experiments have also been made on living beings; thus Edison[1] placed one hand of a man in a solution of lithia and the other in a solution of soda; on a current of 4 milliampères being passed for eleven hours, spectroscopic examination of the urine showed that considerable quantities of lithia had been absorbed. Leduc of Nantes has performed some instructive experiments: he connected two rabbits by a pad of moist lint and applied an electrode wetted with strychnia sulphate to each of them; on passing the current, the rabbit at the anode was poisoned by the strychnia cations passing in, while the rabbit at the cathode which received only the anion SO_4 was unaffected. If, however, the electrodes were moistened with potassium cyanide, then the rabbit at the cathode was poisoned through the migration of the anion cyanogen. Leduc also experimented on himself and produced toxic effects by the ionic introduction of morphia and strychnia. These are then sufficient proofs, if any were needed, that substances can be passed through the skin by electrolysis. It remains to consider to what useful purpose this process can be put. The following is a list of some of the conditions for which electrolysis has been or may be advantageously applied:—Rodent ulcer, parasitic affections, sinus and fistula, anchylosis, sclerosis, fibrous adhesions, strictures, tic douloureux, neuralgia, sciatica, rheumatic and gouty conditions. Leduc was one of the first to treat rodent ulcer by the introduction of the zinc ion; he reported the complete cure of a case by one application. As a rule, more than one application is necessary. The method is as follows:—Having as far as possible cleaned the surface of the ulcer, apply to it eight or ten layers of lint cut a very little larger than the size of the ulcer, soak the lint first in a 5 per cent. solution of zinc sulphate; over the lint place an electrode, if possible of zinc; to avoid the introduction of other ions, connect this to the + pole and connect the − pole to a basin of salt water, into which the patient may place his hand. Raise the current very gradually to as much as the patient can conveniently bear (40 to 60 milliampères), and maintain it steadily for thirty minutes, then gradually diminish it to zero. The surface of the ulcer will now be found to be whitened and dry; if any part has escaped the action, a fresh application limited to that part should be made. The patient should be seen again in a week or fortnight, when another application can, if necessary, be made. Many cases have been treated successfully in this way in the electrical department of the Royal Infirmary. The following are notes of a case:—

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[1] Read before the Edinburgh Medico-Chirurgical Society, February 5, 1908.

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[1] *Int. Med. Congress*, 1890.

Case 1.—D. H., æt. 61, recommended by Dr. R. Maclaren, June 6, 1907.

History.—Six months ago a wart appeared on the right side of the nose; this grew steadily, in spite of various applications. On admission the growth measured $\frac{3}{4}$ in. across and its margins were raised and hard. It was photographed and then treated with zinc electrolysis, a current of 40 milliampères being passed for thirty minutes. When seen again a fortnight later, the ulcer was much improved and the lower hard margin had melted away. A week later a second application was made. On 3rd July he was exhibited to the Medico-Chirurgical Society. On 16th September returned practically well; was photographed again.

All cases of rodent ulcer do not do so well; old ones with a large surface or those which have ulcerated into cavities may not yield to this treatment. Chronic ulcers, sinus, and fistulæ are also amenable to the zinc ion. A sinus should be plugged with a shred of lint moistened with zinc sulphate solution, and a zinc wire should pass into the sinus so as to make contact with the lint; this should be connected to the + pole. One application may sometimes suffice. The copper ion can be tried in ringworm and sycosis. Leduc has found that in fibrous anchylosis and cicatricial contractions the chorine ion has a loosening and resolving action; this has been confirmed by the writer in several cases.

Case 2.—A. B., under the care of Mr. Cotterill, a case of anchylosis of the left knee; patient met with an accident ten months ago; this resulted in a septic condition of the knee, into which many incisions were made, and the patient was in bed for fifteen weeks; the knee became stiff and could not be flexed to more than a right angle. The patient was now treated with chlorine electrolysis, and every application resulted in greater freedom of motion; after three applications his foot could move through an arc of 7 in. more.

A case of Dupuytren's contraction fingers was treated in the same way; the forefinger was bent to a right angle, and the disease had lasted fifteen years. Each treatment loosened and eased the contraction, and after eight applications of half an hour each the finger could be straightened. But sclerosis of other tissues, provided they are not too far removed from the surface, can be successfully attacked. In this way the writer accounts for the great improvement he has obtained in cases of spastic paralysis by passing very strong currents with one electrode moistened with sodium chloride over the affected part of the cord, and the other over an indifferent part. Some part of the current will traverse the affected segment, there will be an exchange of ions, and the action of the chlorine ion will have a resolving effect on the sclerotic tissue, so that nerve impulses will be transmitted more freely. Instead of the chlorine ion the hydroxyl ion OH can be used. Leduc has cured the most rebellious strictures of the urethra by passing a metallic bougie attached to the − pole up to the contracted part, and by passing a small current for ten minutes twice a week. Similar treatment can be employed in strictures of the cervix, œsophagus, etc. For cases of tic douloureux the salicylic ion is useful. The area of distribution of the affected nerve should be covered with several layers of lint, soaked in a weak solution of sodium salicylate. An electrode attached to the − pole should be placed over this, and a large electrode attached to the + pole over the cervical vertebræ. Very great care must be taken to avoid all abrupt changes in the current strength, or the patient will be rendered giddy, and serious symptoms may set in. The current should be gradually raised to a point short of discomfort to the patient (15 to 40 milliampères), and should be maintained for thirty minutes. The following case is instructive:—

CASE 3.—R. M., æt. 58, recommended by Dr. Boyd; patient had suffered from tic douloureux for five months; the pain was stabbing and worst at night, but never away; patient unable to sleep, and up and down all night; cannot open jaw; becoming worn out and exhausted; many remedies tried unavailingly; the first application of 30 milliampères for twenty minutes relieved him for twenty-four hours; a second application three days later had a similar effect; after five applications the patient expressed himself as being greatly benefited; he was able to take food and to sleep, and the attacks had almost ceased.

Sciatica and pleurodynia can be similarly relieved. Another class of cases in which the method may be of service is that of local affections, or where there are local manifestations of some general disorder; in gout, rheumatoid arthritis, and chronic rheumatism and syphilis. A gouty joint can be directly attacked by placing it in a bath containing a solution of a salt of lithia connected to the + pole; on passing a current the lithia will be carried into the affected part and uric acid and oxalic acid, etc., will tend to pass out. Joints affected with rheumatoid arthritis or chronic rheumatism can be treated according to the same method, but other drugs, such as sodium salicylate, may be found more useful. The writer's results with cases of rheumatoid arthritis treated with the salicylic ion have not been very encouraging. Much may be expected from the electrolytic introduction of drugs in the future; instead of having as in former times to give a patient relatively enormous doses by the stomach, which may be injurious to the digestion or toxic, in order that a distant joint or locus morbi may receive a sufficient supply, we can, without disturbing his general condition, introduce directly into the affected part the drug that is likely to prove most useful. There are, however, certain limitations, one is that all drugs cannot be so introduced, only those that dissociate into ions. For example, oils, alcohols, glycerines, do not form ions and do not conduct electricity; the spiritus chloroformi and the glycerinum acidi carbolici could not be used in electrolysis. To introduce these substances electrolytically, their aqueous solutions must be taken. For this reason, too, they are more toxic in aqueous solution when taken internally. Electrolytes also differ in their ionisation, acetic acid and ammonium hydroxide are but slightly ionised, and are therefore poor conductors and more difficult to introduce by this method. Dr. Gonzales Sanchez has made in Professor Leduc's laboratory a study of the behaviour of different ions and of the reaction of the skin and tissues to their electrolytic introduction. I quote some of his results. The halogens and alkalis are easily introduced, and produce if in dilute solution no untoward effects. The alkali earths are also well borne, but if pushed may produce necrosis. The introduction of the ion magnesium is painful, a rose coloration of the skin is produced, traces of which can be seen for more than fourteen days later; manganese also produces a punctiform dark coloration, which may last a couple of months; the dark points indicate the position of the glands, and, as Leduc has pointed out, are a proof that the current enters only by the glands. The ions of the heavy metals coagulate albumin, and are caustic. How far any ion can be made to travel in the tissues is a matter of great interest; upon this depends the value of the method in deep-seated affections. Much must depend upon the length of time the current is maintained, the current strength, the velocity of migration of the particular ion, and its diffusibility. There seems to the writer to be no reason why in the future it may not be possible to attack a phthisical cavity directly, and to diminish the overgrowth of fibrous tissue in any organ. Surely this would be a great step in advance.

A CASE OF ANGINA PECTORIS WITH AORTITIS.[1]

By F. Parkes Weber, M.D., F.R.C.P., *Physician to the German Hospital, London, and to the Mount Vernon Hospital for Chest Diseases, Hampstead.*

Case.—The patient, a German married woman, æt, 42, was admitted at the German Hospital on the morning of 2nd January 1908, and died in the afternoon of the same day. She was a fairly well-nourished, pale-looking woman of medium size, and complained of great pain in the chest to the left of the sternum just above the cardiac area. Over this area there was a good deal of rather coarse crepitation to be heard, but I could make out nothing special by examination of the heart and abdominal organs. The pulse was 95 to the minute, regular, and rather weak. The radial arteries did not feel diseased. There was no dyspnœa. The face was pale and the lips slightly bluish. There was no œdema. The temperature was 99° F. The urine was of specific gravity 1017, free from albumin, sugar, and tube casts, and giving no reaction for aceto-acetic acid (Gerhardt's reaction with perchloride of iron). She had not been ill long, but the history which I obtained from the patient was very incomplete. The temperature was against the idea of any acute inflammatory condition. She was treated with hypodermics of camphor in oil and with small doses of alcohol, as if for a condition of collapse. In the afternoon she was given one subcutaneous injection of 3 minims of liquor strychninæ hydrochloratis (which seemed to make no difference), and oxygen inhalation was employed.

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[1] A paper read at the Clinical Section of the Royal Society of Medicine, London, March 13, 1908.

The pain, however, persisted, the pulse became weaker and the crepitation in the upper part of the left lung (back as well as front) became more marked. There was likewise a little fine crepitation over the right lung. She vomited three times in the hospital, and had vomited once before admission. She died suddenly about 5 P.M., that is about eight hours after her arrival.

Information obtained later on from the husband threw fresh light on the illness. The completed history seems to be as follows:—The patient used to enjoy good health, and never had a severe illness before the present one. She was always pale. Her father died with "dilatation of the heart" at about the age of 60 years. The husband gave no definite history of syphilis. The patient herself had had four children; the two younger ones only were still living; of the two first ones, one was born dead, and the other died soon after birth. During the summer of 1907 the patient used to complain of pains in the stomach, and her fingers used sometimes to turn white and cold ("local syncope"), but otherwise she remained in apparently good health and did her ordinary work as before. From the 22nd December 1907, she commenced to complain of a sensation of pressure in the stomach and pains on the left side of the front of the thorax, and began to lose strength. She obtained pills and medicine from a doctor, but the pains increased every day. The slightest exertion would induce a pain on the left side of the chest. On the night before admission the pain became unbearable. She vomited once.

This history suggested that the illness was a kind of ingravescent angina pectoris ending in a "status anginosus" and syncope, and the necropsy made it certain that this view of the case was the correct one.

The pathological changes were practically confined to the thoracic aorta and the orifices of the coronary arteries, the whole being evidently the result of a process of aortitis, affecting chiefly the first part of the aorta. This first portion of the thoracic aorta was much sclerosed and irregularly thickened and slightly bulged, as if aneurysmal dilatation were commencing. The orifices of both coronary arteries were much stenosed owing to the aortic change, but excepting for this stenosis at their orifices both vessels were practically free from disease. The rest of the thoracic aorta and the abdominal aorta were affected similarly to the first portion, but to a very much slighter degree. The heart, of about normal size, weighed 12 oz., and its muscular substance did not appear diseased; there was no valvular affection. Both lungs were œdematous; there was no evidence of pneumonia, tuberculosis, syphilis, or infarction in these organs. There was no disease of the mediastinal lymphatic glands. The liver (weight 55 oz.) showed signs of chronic passive congestion, but not nearly sufficiently to be termed a "nutmeg-liver." There was a transverse constriction, a minor form of that caused by "tight-lacing." There were no biliary calculi. The kidneys (weight together 11 oz.) appeared free from disease, and the capsules stripped readily. The spleen was of about normal size and weight (weight 6 oz.), and seemed healthy. In the stomach a little submucous ecchymosis was noted. The intestines and generative organs were not diseased except for the presence of an ovarian cyst.

Microscopical examination of a piece of thickened ascending aorta showed the pathological process to be one of aortitis, as yet unaccompanied by any marked atheromatous or calcareous degenerative changes. The intima was irregularly thickened, and in the media and adventitia there were numerous patches of cell infiltration (lymphocytes, plasma cells). These foci of cell infiltration were larger and more numerous in the adventitia, whilst in the media they formed smaller spots and streaks around the vasa vasorum. The presence of one or two giant cells amongst the other cells was kindly pointed out to me by Mr. S. G. Shattock, but they were not typical of tuberculosis, and an examination of sections specially stained for tubercle bacilli gave a negative result.

Remarks.—In regard to the etiology of the aortitis in this case it is impossible to arrive at any absolute conclusion, but there are certain points suggesting a syphilitic origin in spite of the absence of syphilitic change elsewhere in the body. The character of the cell infiltration (lymphocytes, plasma cells) and its distribution about the vasa vasorum in the media is such as might be met with in syphilitic cases. In syphilitic aortitis, according to Heller and others, the ascending aorta is especially affected, as it was in this case. Moreover, the age of the patient, the history regarding her two first children, and the absence of other obvious causes of arterial disease lend a certain amount of support to the syphilis theory.

The clinical history of the case is characterised by the rapid increase in severity of the anginal attacks. At first these troubled the patient only occasionally on exertion, then muscular exertion of any kind would invariably induce an attack. Finally, a severe attack occurred in the absence of any obvious exertion at nighttime, and next morning the patient was admitted with the fatal "status anginosus." Heberden and Huchard have pointed out that nocturnal attacks of angina pectoris are apt to be of long duration; and Huchard has laid stress on the influence of the bed position in increasing the blood pressure and myocardial work, and thus inducing nocturnal attacks of angina pectoris. In some patients subject to angina pectoris the position of rest in bed at nighttime is by no means the position of maximum rest for their cardiac musculature.

In regard to the much discussed question of the causation of angina pectoris, this case is of some interest. Sir Clifford Allbutt maintains that the only essential cause of attacks of genuine angina pectoris is aortitis, but that coronary stenosis is frequently present as a fatal complication. Disease of the coronary arteries, so conspicuously present in many fatal cases, has, he thinks, been wrongly regarded as the real cause of the anginal attacks. On Sir Clifford Allbutt's theory, cases of recovery from true angina pectoris might be accounted for by supposing the anginal attacks to have been due to a condition of aortitis unaccompanied by any considerable stenosis of the coronary arteries. Moreover, the post-mortem discovery of coronary stenosis in persons who during life have never suffered from angina pectoris, might also be explained on the supposition that there had never been sufficient aortitis present to determine an anginal attack. This "aortitis" theory does, however, not account for the occurrence of coronary stenosis without typical angina pectoris, when the stenosis is due to an aortitis more or less occluding the coronary channels at their commencement. On the other hand, the occasional failure of coronary stenosis to produce angina pectoris may be explained by supposing that, when the coronary stenosis is of exceedingly slow and gradual development, the patient may have time to accommodate himself to his disease, and may finally die of dilatation of the heart and gradual cardiac failure without ever having had an attack of angina pectoris. On the "coronary theory" it is also possible to account for occasional cases of recovery from true angina pectoris, for the swelling (due to aortitis) at the commencements of the coronary arteries might in rare cases be supposed to subside without giving rise to permanent coronary stenosis. The present case appears to me to lend as much support to the "coronary theory" as to the "aortitis theory," but can certainly not be adduced as supporting any of the other theories of angina pectoris.

THE PROVISION OF SANATORIA FOR THE CURATIVE TREATMENT OF PHTHISIS AMONG THE POORER CLASSES.

By Alexander Walker, M.D., *Edinburgh*.

The curative treatment of phthisis, even if confined to one class of the community and to one method—the sanatorium—is too big a subject to be discussed in a few pages. I propose, therefore, to leave out of view aspects of the question which are no less important than those which I include, because I feel myself less competent to deal with them than those who have practical experience to guide them. Among these are the difficulty of selecting suitable cases, for which the dispensary system, honourably associated with the name of Dr. R. W. Phillip, is the most successful method; the indoor treatment of the patients, regarding which he and Dr. Caverhill are acknowledged experts; and the unsolved but extremely important question of the after-care of discharged cases. All I shall say on these points is to protest against them being used as excuses for doing nothing, and to express my belief that the first and last will be solved by time and education, whilst the second is now rapidly approaching scientific precision and complete success.

For time and other reasons I will confine myself to an attempt to show that, on *a priori* grounds, the sanatorium is the most promising method of treating early cases of phthisis, that it must be placed within the reach of the poorer classes among which the disease has its stronghold and from which it spreads, and that, to enlist the public sympathy and support, it must be erected and run on inexpensive lines consistent with efficiency, and depend on the freewill offerings of all classes of the community, and not on a compulsory levy made by the State. I leave untouched the thorny question of notification, and only incidentially refer to the disputed points regarding human and bovine tuberculosis.

First, let us consider the reasons why sanatoria may be looked upon as the most promising means of treating phthisis in its early stage.

You will all agree that the tubercle bacillus discovered by Koch in 1882 is the true and only cause of phthisis, and that its discovery has revolutionised our opinions regarding the causes and treatment of the disease. The life-history of the parasite is now well known. Its chief characteristics are these. It is killed by direct sunlight quickly, and by diffused light more slowly. It does not grow except under artificial conditions, and remains alive with difficulty outside of the animal body, but when dried it possesses a vitality which has affinities to the spore-bearing bacteria, and can withstand extremes of heat or cold as well as trituration. It finds the healthy body, especially when its owner is well fed and clothed, and living in a healthy environment, almost impregnable to attack. It is confined practically to one mode of dissemination, namely, the infected sputum of advanced cases among men, and to a limited extent to infected milk or flesh from the lower animals. In the moist condition it is easily destroyed by heat and germicides. The avenue by which it finds entrance to the human body has been much disputed. In this country the natural and direct channel by the inhalation of dust from dried sputum, for the formation of which there is every facility, is generally regarded as the most frequent, though we admit the danger of inhaling floating particles of saliva from the mouth of the patient in the act of coughing, etc. On the Continent opinion is more divided. Flügge and Calmette favour the theory that the dust or "droplets" are swallowed rather than inhaled, and reach the lung through the alimentary system. Von Behring regards the disease as originating from infected milk in infancy, the bacillus remaining latent during early life until puberty or disease wakes it into life. The interim report of the Royal Commission on Tuberculosis seems to suggest that there are two types of bacillus, a human and a bovine, differing rather in virulence than in kind, and interchangeable. They seem to be able to affect the same individual as a "mixed infection," or become modified in transmission, by which a change is brought about in their virulence. It is thought that the human type is increased in virulence in the tissues of cattle, and the bovine decreased in the human tissues. Whatever be the theory, the fact of living and virulent bacilli being found in dust is undisputed, and, whether it is swallowed or inhaled, that they infect the body.

The reasonable inference to be drawn from the above facts and theories is that we have to deal with a foe of subtle and malignant power, but we have on our side as an ally and friend a still greater force—that of Nature. We may not agree with Dr. Ransome, that man is not naturally susceptible to the disease, but needs some local injury or debilitating disease to render him subject to invasion; but there is evidence that we are protected by invisible but powerful forces which are directed by Nature. Both outside the body in the benefits of a healthy environment, and inside in the phagocytic cells and the soluble antitoxins of the serum, we are marvellously protected. Proof of this beneficent rôle played by Nature is to be found in the following facts:—

1. That pathology has demonstrated that a large proportion (variously estimated at from 40 per cent. to 90 per cent.) of autopsies on persons of adult life dying of other diseases, shows evidence of incipient phthisis, or other tuberculous disease, which has not infected the body generally.

2. That there has been a notable decline in the death-rate from phthisis, and less so from other tuberculous diseases, during the last fifty or sixty years. This decline has affected the better classes more than the poorer, and the type of the disease most likely to be influenced by improved sanitation, and better conditions of life, namely, pulmonary tuberculosis. Other tuberculous diseases are more dependent on legislative control of food supplies, and do not show the same decline. The reduction in the death-rate has not been related, until very recently, to any organised attempt to cure or prevent the disease, but is due entirely to the operation of natural laws of health which have been allowed freer play.

3. That whilst the bacillus is known to be ubiquitous, especially in cities, it selects its victims chiefly among those with hereditary predisposition, and prefers localities where unhealthy conditions exist.

In view of the above facts, it is safe to conclude that many persons possess either a natural or acquired immunity from phthisis, that a still larger number have a power of resistance which enables them to overcome the disease even after it has gained a footing, and that this power has been greatly increased recently by improved sanitation, better food, etc., which have aided Nature in her beneficent efforts. It is noteworthy that no other infectious disease has responded in the same degree to the operation of natural laws, but have either required costly measures of prevention, or still resist all efforts to suppress them.

The question has been gravely argued whether we cannot therefore leave the extinction of phthisis to these natural agencies. Those who honestly (and there are very few) believe that this is possible, seriously underestimate the forces arrayed against such a consummation.

Vested interests on the one hand, and ignorance on the other, are obstacles which will bar the advent of a golden age such as More and Richardson dreamt of for many a generation. Some of the contributing causes of phthisis are physically or morally irremovable, and others would need such drastic legislation that many a Government will come and go before one will be found strong enough to pass it into law.

Meanwhile must we await that far-off event? Let me mention a few objections to delay:—

1. That phthisis is a disease of the poor. There are no statistics available to show the class distribution of disease—a fact rather to be deplored. To satisfy myself that the poor were the greatest sufferers from phthisis, I analysed the death register for two years (1903–4) in the city of Aberdeen, and found that 90 per cent. of the cases occurred in the poorer class of property. Dr. Cullen found that something like this prevailed in Edinburgh. The significance of this fact lies in the facility by which infectious disease travels upwards in the social scale. On the low ground of self-protection we cannot afford delay.

2. That the poorer classes have a strong claim on our philanthropy. They have neither the means nor the knowledge to protect themselves. By the "poorer classes" I am not referring to the "legal poor" which have a claim on State aid already, but that large class which is dragged down from independence and even affluence by this long-protracted disease. An early case suitable for sanatorium treatment is hardly ever met with by the Poor Law inspector except among young children. The honest working man or woman labours on till all hope is past, in the vain endeavour to avoid public charity.

3. That the disease is a most costly one. It is calculated that a tenth part of the national pauperism is due to phthisis, and no disease strains the funds of friendly societies so heavily. It attacks its victims at the most useful and productive period of life, namely, between 15 and 50 as a rule. One in every

three deaths from all causes between 15 and 45 years of age is due to phthisis. The results of the compulsory insurance system in Germany are instructive. The banks, which are financially responsible, can compulsorily treat at their own expense any disease which they believe will pay them to cure. On a purely business footing they established about fifty sanatoria, in which, during nine years (1898–1907) they treated over 80,000 working men, and restored over 30 per cent. to health and usefulness permanently. This figure is the net result after four years' continued labour since treatment. The immediate results showed 66 per cent. of temporary recoveries, but half of these relapsed.

4. We have the means to give these helpless folks a chance at a sacrifice infinitely less than we willingly make for less worthy objects. It is said that the means to ill deeds make ill deeds done. Would that the converse were true. From the foregoing considerations I think we are justified in saying that delay is unworthy of us as a wealthy nation.

I am not going to labour the question as to the value of sanatoria. The institution has survived the stage of ridicule and persecution. It is but faint praise to say, as the L.G.B. circular does, that "this treatment has been more successful than any hitherto attempted." Sanatoria have proved a success among the rich, for whom they are not a necessity, and their success among the poor, to whom they *are* a necessity, may be confidently anticipated. No doubt difficulties have to be faced in securing early cases, and providing for after care, but there can be little doubt that education and experience will in course of time diminish if not remove them.

The great hindrance in the way—and I wish to emphasise this point—is the question of ways and means. Unfortunately sanatoria were founded in the first place for the well-to-do class, and were constructed and maintained on expensive and even luxurious lines. Those which were afterwards instituted for people of small means, or for the poor without payment, followed too closely the example set them by the first named. The standard of expenditure both for the erection and maintainance of such institutions for the poorer classes has therefore been far too high, and discouraged the public in supporting them, or in helping to increase their number.

Permit me to give you very briefly the history of a recent effort to establish a sanatorium for the poorer classes.

In the city of Aberdeen there is no adequate provision for the treatment of early cases of phthisis among the poor. In the year 1904 I brought forward a motion in the Parish Council, of which I was a member, to invite a conference with the Town and County Councils to inaugurate a municipal sanatorium. The motion was carried, and the invitation accepted by the other

Councils. Delegates were appointed from each body, and a date fixed for a Conference in the Town Council Chambers. Meanwhile, with the willing assistance of Professor Hay, the medical officer of health for the city, and Dr. Watt, the medical officer of health for the county, I drafted a schedule of twenty-three questions, and sent them to all the then known sanatoria open to the poorer classes. I received a mass of information, which I collated, and, after submitting it to the gentlemen above named, published it in the public press, and, in the form of a reprint, circulated it among the members of the three Councils. Not content with documentary evidence, I personally visited almost all the Scotch sanatoria. Meanwhile the subject was brought before the Medico-Chirurgical Society of Aberdeen by Dr. Arthur Lister, and there was a general feeling, far more favourable than we expected, expressed by the members in favour of the scheme he suggested, which was on quite as aggressive lines, though not identical with those I was advocating. Dr. Lister received from one of his patients an offer of £1000 if a sanatorium was begun within six months, and a sum of money was expected from one of the charitable trusts. There was a considerable amount of public interest created, and the usual flood of correspondence appeared in the papers. The opposition turned almost exclusively on the question of finance. There was no objection to a sanatorium if the money did not come out of the pockets of the ratepayers. Of course the difficulties I have mentioned above were urged and exaggerated by some, who were perhaps ashamed to put their hostility on such selfish grounds, and some considered that Aberdeen should wait to see what other cities were going to do before taking action itself. The hardest argument to meet was the expensive style of the present institutions. Figures were given of the cost of erection and maintenance of certain sanatoria which shall be nameless, and it was argued quite reasonably that Aberdeen could not afford to equip and support such institutions.

I was in hopes of being able to bring forward evidence at the Conference to show that efficient sanatorium treatment could be provided at very much smaller expense than the objectors made out, but I had no opportunity of doing so. About a week before our Conference was to have met, the Local Government Board for Scotland issued a circular, the terms of which made it impossible to go on with the scheme we had in view. Thus, at a stroke, all the labour of months and not a little expense was thrown away, unless we consider the discussion of the subject — from an educational point of view—a sufficient recompense.

Disappointed as I was with this result, it was with mixed feelings that I read that circular. I rejoiced to see that it gave effect, in authoritative fashion, to the opinion of the bulk of the medical profession, that tuberculous disease of the lung was infectious. This is a step forward in the campaign against the disease, and in this matter it is in advance of the English Board. Many other features of the circular commended themselves to me as statesman-like and to the point. But I fear that the attempt to make the provisions of the Public Health (Scotland) Act apply to this disease is to say the least misleading. No doubt the circular is not compulsory, and the Local Authorities need only preserve a masterly inactivity, in face of an impossible task. If the terms of the document had been compulsory, it would have been met, in my opinion, with polite but firm resistance as impracticable or premature. There is no attempt to discriminate between the infectious and non-infections stages which distinguish phthisis from all other communicable diseases, and which makes it unamenable to the same mode of treatment administratively. It is true that the non-infectious stage may be short, as in acute tuberculosis and in a few otherwise normal cases, but this is exceptional. Indeed, in many intermediate cases, and even a few advanced ones, the sputum may be absent, or free from the bacillus, and, even when present, it may be destroyed so as to render the patient perfectly harmless as a source of infection. How far the law would permit the custodians of the public health to go in restricting the liberty of a person who was not actually, but only potentially, a source of danger to the community, may be a nice point for the lawyers, but I for one would not submit to such interference, and I am certain that would be the position of the public generally. Yet the whole of the 1897 Act applies to infectious diseases, and therefore is inapplicable to non-infectious cases of phthisis.

Yet the circular goes on to point out, among the provisions of the Act which it is the duty of the Local Authority to apply, the establishment of a number of institutions which have, for their main or sole object, the curative treatment of the early and non-infectious cases of phthisis. In no other disease is there an incipient stage prolonged into months or even years, and the Act does not contemplate such a type of disease. It is wholly unsuited to the character of phthisis except in the advanced stage, and even then not satisfactorily. It is suggested that existing sanatoria might be utilised, but it is not indicated what the relations of the Local Authority are to be towards the proprietors or promoters of these institutions. A sub-committee of the Local Authority is to be appointed "as the administrative centre of the whole organisation dealing with phthisis," and to be called the "phthisis committee." If this has to have any such general executive powers, surely sanatoria will come under its control. Unless the distinction between infectious and non-infectious stages of phthisis is recognised and separately dealt with, all institutions receiving patients suffering from it should come under the control of the Public Health Authority. This would include sanatoria, dispensaries, day and night shelters, and hospital wards.

Are the Local Authorities prepared to undertake such a responsibility? Most assuredly not, and it is doubtful whether they should do so even if they could. It is no doubt the dream of the Socialist that all diseases should be a first charge on the National funds. But this idea, like most others coming from the same quarter, would be disastrous to the true interests of the nation. It has been the glory of the last century that it has developed on national lines a grand spirit of charity, expressed in personal service and voluntary gifts in the relief of the sick and helpless poor, and no compulsory and vicarious mode of administration would keep it alive. The tax-collector can never be the almoner of true benevolence, and officialism would extinguish philanthropy. The Local Authority should confine itself to its proper function of the protection of the public health, and leave the curative treatment to voluntary agencies. Still, as curable cases include a certain proportion of infectious persons, there is every reason for the rating bodies subsidising curative institutions as part of a preventive policy. The admitted failure of poor-law administration is an illustration of the inadequacy of State methods in charity work, and the demand for personal and direct helpfulness, such as has been developed at Elberfeld, is evidence of the dissatisfaction even in this country with official methods.

Dr. Byrom Bramwell, in his paper last year pointed out the desirability of an amending Act making special provision for the control of tuberculous diseases when in an infectious stage, and I would strongly support this suggestion. It should not be impossible to alter the clauses of the Act of 1897 to carry out this idea, but a fresh measure applicable to this disease would be well worth the labour of drafting, and would immensely simplify the administrative control.

The extravagance which distinguishes public boards, and which is becoming more pronounced since the Socialistic element is increasing in their membership, would lead to an expenditure on sanatoria and other institutions which no country could bear. It would lead also to a further decline in the independence of the poorer classes, now sadly wanting, and encourage the demand for greater privileges at the expense of the State. An illustration of the extravagance of public boards in this direction is to be found in the erection recently by the Liverpool Guardians of a sanatorium at Heswell for twenty-four beds at a cost of £12,000, or £500 a bed. The Birmingham Municipality has just bought a site for a proposed sanatorium for £17,000, and in doing so have hung a millstone round its neck. However simple and inexpensive the building may be, this initial expenditure must handicap the institution permanently.

Although I have thus frankly animadverted on the form in which this circular has been issued, I gladly express my admiration for the spirit which has prompted it. The able medical member of the Local Government Board has no more sincere friend and well-wisher than his present critic, for I am fully aware that he is whole-hearted in his anxiety to grapple with the scourge of consumption. Before leaving this matter, let me quote one sentence from the circular for which I am truly grateful. On p. 4, the secretary says: "It may be added that in structure sanatoria may be of the simplest and cheapest form. Wood and iron sanatoria have been provided at Woodilee and Gartloch asylums at, approximately, £90 per bed. Open-air shelters can be provided at from £6 to £8 per bed, or even less."

In what remains of my time I wish very briefly to bring before you a few of the facts I ascertained by the inquiry to which I alluded at the beginning of this article.

My inquiries were directed to find out the number of beds available for the treatment of poor or assisted patients, the length of treatment found necessary, the demand for admission which existed, the stage of the disease when admitted, the style of building, altitude, site, and construction of the sanatorium, the staff employed, mode of government, the sources of income, cost of the structure, and of maintenance, and the results of treatment. I will only attempt to discuss a few of these points.

1. *The number of beds.*—In all I found that 1084 beds were open in July 1905 throughout Great Britain. All but two of the sanatoria were intended primarily for early cases, but some were compelled to admit a few intermediate ones. The length of treatment varied from a few weeks to six months. The average was three and a half months. About 3000 patients were treated annually. Now in 1905, 45,324 persons died from phthisis in Great Britain. There are no statistics to show what number of persons living are the subjects of the disease, but experts generally agree that they must be five times as numerous as the fatal cases.

The case mortality of phthisis is much disputed, being variously estimated by different authorities at from three to eight times the number of deaths. The duration of the disease of the ordinary type is so long, probably five or six years on an average, that the figure I have mentioned cannot be excessive. The number of cases of incipient disease, before an assured diagnosis can be made, must be very large, judging from the post-mortem evidence I have already alluded to. They are likely to increase rapidly as the means of diagnosis become more extensive and accurate. The opsonin method and Calmette's ophthalmic reaction, as well as a more careful study of physical signs, may enable us to anticipate the appearance of lung invasion, and so enormously increase the number of those who ought to receive preventive treatment.

It is no exaggeration to say that in the year 1905 fully 200,000 people could be found in various stages of the disease.

Suppose we reckon the early cases at a fourth of that number, we find that 50,000, of which at least 40,000 must be poor people, were in need of sanatorium treatment. You will agree with me that 1084 beds are grossly inadequate. From all of my correspondents came the pathetic tale of having to refuse hundreds of applicants for admission, from want of room. Since 1905 a good number of such sanatoria have been opened, and probably the beds available may now be 1600, with room for about 5000 patients annually.

2. *The sources of income.*—In all but four a considerable part of the income was derived from patients who paid all or part of their board, the sums varying from 2s. 6d. a week up to £2, 2s. They were therefore enabled to meet the demands of middle-class persons who could not afford private sanatorium charges. The income so received helped to keep the institution open for their poorer brethren. Public and private voluntary contributions in the form of endowment of beds or payment for patients or ordinary subscriptions were received by all. Subscriptions from friendly societies were given in several cases, and in nine sanatoria help was given by the Town, County, or Parish Authorities either as subsidies or endowment of beds, or payment for individual patients. In one (Durham County Sanatorium) a novel and most excellent system obtains, namely, a levy (voluntary, of course) on working men of 1s. a year, in virtue of which the subscribers are entitled to free treatment for the average length of time for themselves, or any member of their family over 15 years of age.

This yields about £700 a year, and has been satisfactory to all parties. The men receive also a share in the management of the institution. The mode of government generally is to give due representation to all who support the sanatorium as far as possible in proportion to their contributions.

3. *The cost of the structure.*—On this point it was found impossible to arrive at an accurate or in some cases even an approximate estimate. Several were old buildings adapted and extended, and in two were merely rented. In six instances they were gifted by wealthy donors. These cost between them nearly £400,000, or an average of £760 a bed. The highest was £1000, and the lowest £620. Possibly, according to the ancient saw, we ought not to "look a gi'en horse in the moo'," and presumably these buildings have been erected in accordance with the terms of the donor, but it is certain that that sum is far too great for a working-class institution. Yet we find other sanatoria, perhaps in a spirit of rivalry, erected at a cost not much less, though drawing their funds from people who cannot afford such magnificence in their own homes. Two of them reach £500 a bed, and one £300, and the average of all the non-gifted institutions is £200 a bed. How much the glory of the promotors, or the ambition of the architects, or the greed of the contractors, have

to do with this state of things, we know not, but honesty compels us to call it extravagance. The furnishing and maintenance of these palatial places more or less corresponds with the style of architecture, and provides luxury utterly unsuited to the plain tastes and the proper needs of the inmates. At first they feel uncomfortable and out of place, and by and by may blossom out into "bloated aristocrats," discontented with the humble home to which they may be able to return. We hope they may for ever be disgusted with dirt and evil odours, but not with simple food and plain furnishing. What do they want with tiled hearths, silver-plated fittings, stained-glass windows, and gilded decorations? Beauty is all very well, but surely it is out of place in such a building. Economy is absolutely necessary if we hope to carry the public with us in this crusade.

We can find such economy in a few of the sanatoria, and it is noteworthy that their record as curative institutions is as high as the extravagant ones. Durham Sanatorium is a case in point. The new wings it added to the old building, which was a mansion-house, and is used as an administrative block, cost only £86 a bed. Also at Kelling, in Norfolk, the cost was only £130 a bed. At Kelling two pavilions have just been erected of "Mack" slabs at £59 a bed. Both these sanatoria have an excellent record of recoveries. At Woodilee and Gartloch the buildings cost only £90 a bed, and every essential is to be found without any unsightliness or discomfort. At Craiglockhart we have a building of the same unpretentious but efficient character.

On the Continent and in America, buildings of a still simpler and cheaper kind have been used with complete success, and the shanty or shelter referred to in the L.G.B. circular has been extensively used in the grounds of sanatoria, as at Craigleith and many other places. If the money which has been spent on the structure of sanatoria in Great Britain up to this time, and which must have amounted to three-quarters of a million at least, had been used as it might have been, more than 7000 beds could have been now available, and 20,000 patients received treatment.

4. *Cost of maintenance.*—The management expenses of the sanatoria varied in a surprising way, though not so strikingly as the capital cost. In two it reached as high as £2, 2s. a week, and in one case sank to the modest sum of 10s. a week per occupied bed; the average over all being about 28s. a week.

In an institution in which good feeding is an essential part of the treatment, one would have expected this item of expenditure to be fairly constant, but it was nearly as varied as the general expense. The food bill stood at 20s. a week per occupied bed in one instance, and at 6s. in another. No difference in locality, or price of commodities, could account for such discrepancy. Home produce in the shape of vegetables, fruit, milk, butter, eggs, poultry, etc., no doubt reduced the cost in some.

With three exceptions, and even then with modification, the now discredited over-feeding system has been abandoned, and a generous diet substituted. But there can be no doubt that a dainty fare, for which there is little excuse in the case of people used to simple diet, must be responsible for some of this extravagance. The average food bill stands at 11s. 6d. per week, and if we exclude some of the sanatoria as extravagantly provided for, the average would stand at 10s. per patient, or even less.

In connection with this maintenance question, it is reasonable to compare sanatoria with other similar institutions. The district asylums of Scotland run them close in matters of staffing, in management requirements, and in the class of patients received. The average cost of maintenance in 1904 was 10s. a week per occupied bed, of which 4s. was spent on food. Admitting that this latter amount could not provide a sanatorium diet, and adding 7s. 6d. to bring it up to the standard, we found the total management should be 17s. 6d. in place of 28s. per week. In the Edinburgh Royal Infirmary the total cost of maintenance for an average of 832 patients, and 400 resident members of the staff, amounts to 24s. per occupied bed per week, and the food bill to 4s. 4d. for the patients and 7s. for the staff. The cost of drugs, instruments, dressings, etc., amounts to 2s. 6d. a week per patient, and, as they are an infinitesimal expense in sanatoria, we may claim that hospital maintenance stands at 21s. 6d. as compared with 28s. The Aberdeen Royal Infirmary stood at 20s. per week in 1904, and the food bill at 7s. There is emphatically room for economy in sanatorium management, and if we expect the public to be with us in the crusade, this must be attained.

5. *The results of treatment.*—This point need detain us but a moment. The results are so differently reported that they cannot be tabulated. In some cases the after-history has been traced for from one to five years. Without attempting to go into details, I have no hesitation in saying that 60 per cent. of the early cases must have been arrested or temporarily "cured," though that word is not an appropriate one for any disease of a chronic nature, if used without qualification. After some years' watching, 40 per cent. of them still maintained their health and capacity for work. Even a proportion of the intermediate cases were restored to health and usefulness, varying from 10 to 15 per cent. In almost every case an immense benefit was derived from the treatment, enough to make any institution carried on under secret methods, and run on profit-bearing lines, a mine of gold to its proprietors. Even if this were all, and only a few months of relief, or a few years of life, were the result, would any of us grudge all he possessed to purchase a respite from the approach of the last enemy, or fail to bless the hand that shielded us even for a time from his assault.

But even if this were all, and the "cures" as illusory as some arm-chair critics would have us believe, the sanatorium has justified its existence as an educational institution of the first water. From it come forth men and women who have been taught the principles of healthy living, and, as "living epistles known and read of all men," preach a gospel of health far more effectively than an army of inspectors, or tons of literature.

In conclusion, and to sum up, let me repeat the salient points I have tried to bring out:

1. That phthisis is a disease that can be cured by open-air treatment in the early stage.
2. That the poorer classes are the chief sufferers, and that we are bound to help them on humanitarian and even selfish grounds.
3. That curative treatment cannot be a matter of State intervention, but a duty of the whole community, including the poorer classes themselves.
4. That strict economy in providing and maintaining sanatoria is essential in enlisting public sympathy and support.

THE CHEMICAL ASPECT OF THE ABSORPTION OF NITROGEN.[1]

By David Fraser Harris, M.D., B.Sc. (Lond.), *Lecturer on Physiology and Histology in the University of St. Andrews.*

I am fully aware that the subject on which I address you this afternoon is a very large one, seeing that it is coextensive with the subjects of the digestive hydrolysis, absorption proper, and incorporation of protein food, but it is exactly that comprehensive survey that I wish you to take along with me of all the stages of change which nitrogenous nourishment undergoes from the time of ingestion until it is part of our own living bodies. By scanning the chain of nutritional events in this fashion, we shall the more easily understand the significance of recent experimental work done to elucidate certain stages of the great process which were admittedly not thoroughly understood, because not hitherto thoroughly investigated by the experimental method.

Oxygen is the only element which mammals can assimilate in the elemental form. Although carbon, hydrogen, nitrogen, phosphorus, and sulphur, as well as oxygen, all exist in protein food, none of them except oxygen can uncombined enter into living matter. Without nitrogen, however, there can be no living matter: nitrogen, the most inert of the elements in the eyes at least of the inorganic chemist, is of the chemical essence of life.

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[1] An Address delivered to the University of St. Andrews Chemical Society, January 27, 1908.

It has been said, "No phosphorus, no thought," but it is equally true, "No nitrogen, no life at all."

Possibly the union denoted by C≡N is a very labile one. Unlike plants, animals can deal with no nitrogen that is not in a protein molecule; no free nitrogen is metabolised, no nitrates taken up by animals, and conversely no free nitrogen is excreted, nor do any nitrates or nitrites exist in the urine. It is the nitrogen that is the expensive element in the food; at least the nitrogen in animal proteins: the butcher's bill is always by far the largest of the food bills.

I must, in the first place, direct your attention to some figures so that we may have before us certain quantities regarded as "normal" for the substances named. If we ingest 100 to 120 grms. of protein food per twenty-four hours, we take in between 15 and 20 grms. of nitrogen. This nitrogen is excreted in the following forms and relative quantities:—

As urea, constituting 86 per cent. of the total nitrogen excreted in the urine.
As ammonia, constituting 3 per cent. of the total nitrogen excreted in the urine.
As kreatinin, constituting 3 per cent. of the total nitrogen excreted in the urine.
As uric acid, xanthin, etc., constituting 2 per cent. of the total nitrogen excreted in the urine.
As hippuric acid, pigments, aromatic sulphates, nucleo-protein, constituting 6 per cent. of the total nitrogen excreted in the urine.

Urea is clearly by far the most abundant nitrogenous katabolite of the body. The older view was that all the nitrogen contained in the 30 to 33 grms. of urea excreted per twenty-four hours had all been an integral part of nitrogenous tissue, which in its turn had obtained it from previously absorbed food. On this view, therefore, all urea was tissue-derived, and therefore its amount could be used as a measure of the antecedent tissue-katabolism. This was virtually Pflüger's view of tissue-metabolism, *i.e.* that urea was endogenous.

But let me in the next place lay before you some reasons why we do *not* now think that urea is a measure of tissue-change.

1. The urininary urea does not vary as the energy of tissue activity, *e.g.*, hard muscular work does increase the urea.

2. Hard work, whether in starved or in fed animals, does not cause the urea and the CO_2 to vary together in a fixed ratio, which of course they should do if nitrogen of protein tissue and the carbon of the same are being simultaneously oxidised.

3. The third consideration depends on the great difficulty, well known to feeders of cattle, in putting up what physiologists call "the level of nitrogenous equilibrium." It is notoriously difficult

to increase to any marked extent the weight of body-muscle, for instance, by an increasing intake of nitrogenous food. The nitrogen stored in the body is not even proportional to the increase of the food; whereas the urea excreted certainly is. It would obviously be very inconvenient and expensive if the body-weight could in this fashion be indefinitely raised. When, on the other hand, one cuts down the nitrogenous intake, the urea falls off proportionately. In other words, the urea rises and falls with the amount of nitrogenous food taken: it is not proportional even to to the mass of muscle in the body. Two persons of very different body-weights, provided they ingest the same amount of nitrogenous food, will excrete practically the same amount of urea per twenty-four hours.

4. The last consideration is one due to the physiological chemist Mr. Leathes, who points out that only about 10 per cent. of the carbon of protein food is united with nearly all its nitrogen in urea. Thus, from 100 grms. of protein containing between 15 and 16 grms. of nitrogen, there are 6 grms. of carbon in the 30 grms. or so of urea arising, *i.e.* the other 90 per cent. of the carbon of protein must be metabolised in unions which are non-nitrogenous.

We may now ask ourselves in what chemical combinations does the nitrogen of protein pass from the lumen of the bowel into the blood and thence to the lymph and tissues for incorporation. This is truly a large inquiry, as it covers the subjects of digestive hydrolysis of protein, absorption, and tissue anabolism. We need not go further back than the view held by Kühne of Heidelberg in consequence of work done by him along with Chittenden, now in America, in the late seventies and the eighties. Kühne thought that albumin, *e.g.*, was in the course of digestion split up into a hemi- and an anti-portion, the former only becoming hemi-peptone fit for absorption, the latter giving rise to leucine, tyrosine, and other amino-acids, which he thought were not absorbed and therefore were regarded as wasted!

Kühne's experiments were done *in vitro*, and he doubted if they represented what went on in the living animal, in which he thought that still *less* hydrolysis occurred.

Quite the opposite view is held to-day: it is known that Kühne studied imperfect hydrolysis, and the reverse of what he taught is now held, namely, that not peptones but amino-acids are the normal "end-products" of digestive proteolysis.

It had always been difficult to believe that peptones were the end-products of protein digestion, and as such absorbed. Peptones in the blood lower the blood pressure to an extreme degree, and unless precautions are taken the animal may die of collapse. Again, peptones are never normally found in the blood; when they do gain access to it they are excreted by the kidneys (peptonuria). The orthodox view, however, was that the intestinal peptones in absorption were dehydrated by the intestinal epithelium into the blood-plasma proteins.

On this view, of course, the serum-albumin and serum-globulin were the ultimate form of protein nourishment for the living cells ("circulating" proteid theory of Voit).

We shall have to examine the evidence, then, for two things—(1) Whether peptones *are* the precursors of blood proteins; and (2) whether the food can be regarded as at all directly the antecedent of blood proteins.

The main experimental evidence that protein of blood was formed from peptone of the bowel was certainly indirect. In a loop of intestine with blood perfused through its vessels, a certain quantity of peptone was placed; the circulation was maintained for an hour or more. On examining the intestinal contents no peptone was found in the lumen, and as no peptone was found in the blood, it was concluded that the peptone of the gut had been changed into protein of blood. Seeing that this is a positive conclusion from two negative premises, it lays itself open to criticism.

On repeating this experiment, Drs. Leathes and Provan Cathcart found that though the muscle of the bowel might be said to be still normal or at least irritable, that could not be said of the epithelium. Further, there was more nitrogen present in the contents of the bowel at the end of the experiment than there had been at the beginning, so that *absorption* of nitrogen there certainly had *not* been. The added nitrogen seemed to have come from the desquamated epithelium, and perhaps also from some sanguineous exudate. In place of peptone certain amino-acids were found in the bowel, so that presumably the erepsin of the intestine had fermented the peptone into these simpler substances.

With regard to the still wider question whether the blood proteins are recruited from the food proteins, the evidence in its favour is not any more satisfactory.

An experiment specially designed to meet the case was devised by Aberhalden and Samuely as follows:—

A horse was repeatedly bled till it had very little of its blood proteins left, and it was then fed on a protein from wheat known as gliadin. Gliadin yields 36·5 per cent. of glutamic acid (amino-glutaric), whereas the horse's serum-proteins yield only 7 to 8 per cent. of it. After a sufficient time of gliadin feeding, it was found that the horse's serum had exactly as much glutamic acid as before, so that it was very improbable that it had been recruited from the gliadin; certainly it had not been so by any direct process of absorption of glutamic acid.

But if we reflect on the origin of blood, we shall see that the blood with which an animal is born cannot have been derived from its food. Long before birth, the embryo has blood; it is developed *pari passu* with the heart and vessels from the same mesoblastic angioblasts.

Blood is really a tissue, although a fluid one; its intercellular material being a liquid instead of a solid.

Blood is to be regarded as a vehicle; a colloidal solution for the purpose of conveying hæmoglobin, salts, nitrogen-free and nitrogen-containing materials for the nourishment of cells as well as for the removal of all manner of waste-products for the well-being of cells.

We seem to have pretty good evidence in cases of starvation that the blood-proteins are not food for cells, for it is well known that in starvation the amount of these undergoes practically no diminution—nothing like sufficient to account for the continued life—energy output—of the bodily tissues. In starvation, then, it is evident that the tissues do *not* live on the "circulating proteid."

Now it is striking that a study of starvation, a condition of no food income, should afford us fairly direct clues as to how the tissues behave when there *is* a food income.

In inanition we distinguish between the "noble tissues" and the "less noble"; the former are chiefly brain, the central nervous system, and the heart; the latter are fat, muscle, and the connective tissues. Not much thinking over what occurs must suffice to show us that in starvation, hysterical anorexia, fevers, and in melancholia, the noble tissues are literally living on the less noble. The present belief is that the less noble tissues undergo a solution called autolysis (originally called auto-digestion), the soluble, relatively simple products of which are carried *via* the blood and lymph to the heart and the nervous system to be incorporated there. It has been recently shown that in aseptic autolysis *in vitro*, an organ such as the liver liquefies to ammonia, glycocoll, histidine, leucine, tyrosine, and tryptophane, amongst other substances. The enzyme in tissues which carries out this breaking down has been isolated by precipitation with ammonium sulphate. This autolysis is to be sharply distinguished from putrefaction: it is a process of pure katabolism (no anabolism being possible), and therefore a vital process; as a vital process it is delayed by antiseptics or chemical inhibitants of vital manifestations.

There is a strong presumption, then, that nutrition in starvation, contradictory as the expression seems, is by amides and amino-acids derived from organs autolysed and carried to organs which can synthetise these katabolites or *Bausteine* into tissue protein. Thus the Rhine salmon while in fresh water, in which it does not feed, nourishes its reproductive organs at the expense of its muscles.

The tissues would therefore appear to have an autolytic enzyme protein-disintegrative in action, and also another or protein-integrative enzyme; if it were proved to be the same enzyme operative in both cases, would this not be something very like a case of "reversible zymolysis"? Starvation then teaches us the chemistry of food absorption. This transference of soluble materials from one part of the body to the other has a close parallel in the case of the germinating seed. Schultze and Winterstein have shown that the proteins stored in the seed are hydrolysed during germination into the following amino-acids which ascend in the sap to the growing regions, in whose cells they are synthetised to protein, namely, leucine, alanin, phenyl-alanin, tyrosine, cystin, glutamic acid, aspartic acid, amino-valerianic acid, tryptophane, lysin, arginin, and histidine.

To return to the food in the intestine,—it is now known that the hydrolytic breakdown is complete,—the following have been recognised as present in either stomach or intestine:—

Glycocoll or amino-acetic acid; leucine or amino-iso-butyl acetic acid; alanin or amino-propionic acid; phenyl-alanin; tyrosine or oxyphenyl-alanin; valin or amino-valerianic acid; aspartic acid or amino-succinic acid; glutamic or amino-glutaric acid; cystin or α-amino-β-thio-propionic acid; lysin or diamino-caproic acid; arginin or guanidin-amino-valerianic acid; histidine or imidazole-amino-propionic acid; tryptophane or indole-amino-propionic acid; and α-pyrrolidin-carboxylic acid.

If these and such bodies are the forms through which protein passes in the intestine previous to absorption, it ought to be possible to maintain nitrogenous equilibrium in an animal fed only on these or some of these crystalline derivatives of protein. Such feeding has been successful. Dogs have been fed on the aseptic products of the autolysis of the pancreas, *i.e.* on soluble, crystalline substances which gave no biuret reaction at all. Of course starch and fat had to be added to make up the necessary calories. The body-weight rose from 11·9 to 12·9 kgrms. in eleven days, and 9·8 grms. of nitrogen had been retained. Similarly, rats were kept in nitrogenous equilibrium on a digest of ox-pancreas and dog's intestine from which everything that gave the biuret reaction had been removed.

The supposed great loss of potential energy when amino-acids instead of peptones are oxidised has been greatly exaggerated; it is quite a mistake to suppose that beyond the peptone stage the potential energy of the amino-acids is negligible. It has been shown by accurate calorimetric observations that 1 grm. of dried pancreatic digest-powder freed even from leucine and tyrosine, gave only 10 per cent. less than 1 grm. of dry powdered meat.

In connection with this subject of keeping animals alive on the hydrolytic products of proteins, a very curious observation has been made. If instead of the tryptic or autolytic ferment, HCl be used in the hydrolysis, the products will *not* keep animals in nitrogenous equilibrium. The explanation offered is that the acid destroys certain combinations—polypeptides—in which the products of hydrolysis must be presented to the living matter. The acid uncouples certain linkages which the ferment does not. The cells cannot put the débris together if these particular "peptide" linkages are destroyed; in other words, there are limits to the breakdown by enzymes; the enzymes are specific or discriminating in their action, whereas the HCl is not. What the enzyme undoes but not what the acid undoes, the cellular enzyme the protein-integrative can build up. There is here a preadjusted correlation between enzyme and enzyme which does not exist between acid and enzyme.

As earlier observers had found such small quantities of amino-acids in the bowel, they had regarded them as not normally formed to any but a slight extent *in vivo,* and to any great extent only *in vitro.* But, as Dr. Leathes remarks, if they are formed in the intestine, it is surely for absorption from it and not accumulation in it. If they are formed at all and yet do not accumulate —and we have incontestable evidence that it is so—this of itself would indicate to us that they are being constantly absorbed.

The next place, of course, that they ought to be found is in the blood. Some observers having failed to find any, and others having found only traces, have concluded that normally amino-acids do not reach the blood. But, once more, the same argument applies: they are not for accumulation in the blood, but to be picked out by the cells everywhere. Besides that the technique of separating amino-acids from the blood is very tedious, the total amount of them derivable from 100 grms. of protein absorbed during sixteen hours of the twenty-four must be very small indeed. A calculation has been made in which it is shown that, assuming the data just given and that leucine is 20 per cent. of the protein being absorbed, and that there are 5 litres of blood in the body one-tenth of which passes per thirty seconds through the intestine, there could only be 2 mgrms. of leucine per litre of blood to be detected.

Drs. Leathes and Cathcart have shown that during full protein absorption they *could* detect *in the blood* of the dog an appreciable increase of substances not precipitable by tannic acid, and therefore not protein at all.

But by no means even all the amino-acids in the bowel reach the blood as such. There is a denitrifying enzyme at work in the intestinal mucosa. This ferment splits off the amidogen as NH_3 which, sent to the liver by the portal blood, is there worked up into urea—food-derived urea—and passing on into the general blood is excreted on arrival at the kidneys.

There is a notable rise in the NH_3 of the portal blood during absorption of protein food. Thus the denitrification of the amino-acids would leave the corresponding fatty acids, oxyacids, or thio-acids to proceed to the tissues to be appropriated for their energy-transforming purposes. Thus a portion of what was nitrogenous material at the beginning is used in the tissues in a purely non-nitrogenous metabolism.

Some unaltered amino-acids, then, do reach the blood, the fate of part of which would seem to be denitrification by the tissues. A denitrifying enzyme has been found in a large number of tissues; tissue-extracts incubated along with certain amino-acids have been found to give rise to ammonia. It would thus seem extremely probable that there is in tissues an enzyme which keeps guard over the protoplasm denying the entrance to it of amidogen nitrogen, and admitting only fatty acids to the inner recesses of the living cells for oxidation. Thus energy-transforming processes are concerned with a purely non-nitrogenous metabolism. The amidogen split off by the tissues is the precursor of a second portion of urea which is still food-derived. Now urea is excreted in starvation, though of course in diminished amount. It is not, for all that, tissue-derived urea, if we mean by "tissue" here the "nobler tissues," for it is very largely muscle-derived, and, as we have seen, the body-muscles are in inanition used up as *food* for the nobler tissues. It is only tissue-derived if by "tissue" we mean the less noble tissues, which are, however, autolysed and carried to the nobler in a completely broken down state.

As regards the nobler tissue, this starvation-urea then could be technically styled as still "exogenous."

There is some evidence that the three substances, histidine or imidazole α-amino-propionic acid, tryptophane or indole α-amino-propionic acid, and α-pyrrolidin-carboxylic acid reach the blood and for a time remain in it non-denitrified. They are all heterocylic with side chains. The first mentioned and the next have amino-propionic acid as the side chain. Histidine has imidogen and nitrogen in the ring; the last two have imidogen in the ring.

Now histidine is interesting because it is a constituent of nuclein, and nuclein is the basis of the nucleus, and in the nucleus, as has long been known, all cell-metabolism originates and from there is presided over.

We seem to know something, then, thanks to the labours of the chemists, of the nature of the combinations in which nitrogen arrives at the living tissues. It is this imidogen nitrogen and nitrogen in the ring which seems to be characteristic of that nitrogen which has run the metabolic gauntlet and arrived in an acceptable form at the living cell.

While amidogen seems destined to be kept at all costs out of protoplasm, imidogen does not; now there is but one atom of hydrogen of difference between the two. Nitrogen with two hydrogen atoms is the precursor of nitrogen with three hydrogen atoms, and is to be got rid of as urea, while nitrogen with only one hydrogen atom seems assimilable. Once again we have forced upon us the importance of the "infinitely little."

We may finally ask ourselves, in what form does nitrogen leave the muscle, obviously the most important nitrogen-holding tissue? A very little may leave it as urea, true endogenous or tissue-derived urea; some as ammonia, some certainly leaves it as uric acid in the form of urates (endogenous uric acid), some leaves it as kreatin.

By far the most abundant extractive of muscle, however, is this last-mentioned kreatin, which may amount to 0·4 per cent. of striated muscle; there may therefore easily be 100 grms. of kreatin in the body of the adult male of average weight.

The output of kreatinin in the urine per twenty-four hours is only from 1 to 2 grms.; now kreatinin is dehydrated kreatin. It has hitherto been assumed that the urinary kreatinin is the renal representative of the kreatin that leaves muscle. Since in starvation kreatinin is still present in the urine, and since on a kreatin-free diet there is still kreatinin in the urine, there must be an endogenous or tissue-produced kreatinin.

It is well known that all so-called foods of the order of Bovril, etc., which largely consist of "extractives" of muscle including kreatin, give rise to an increase of urinary kreatinin: this is an exogenous production, and as such is at present not under consideration.

The following may be adduced as our reasons for holding that not urea but kreatinin is a measure of the antecedent tissue katabolism, especially that of the muscles:—

1. In starvation, kreatinin is still excreted.
2. In fevers, on non-nitrogenous diets, kreatinin is still excreted.
3. With a very low nitrogen intake, the nitrogen of kreatinin may be as much as 17 to 20 per cent. of the total nitrogen output.
4. More kreatin is found in active than in resting muscles.
5. Muscular activity is followed by increase of kreatinin.
6. The kreatinin excretion in any one individual varies as his mass of muscle.
7. Provided that the food is kreatin-free, the kreatinin output does not vary with the food (*i.e.* the kreatinin is of endogenous origin).
8. Kreatinin, being found in the urine of the newly born, cannot there be an index of food disintegration.

Seeing, then, that kreatinin varies as the mass and activity of muscle, and that urea does neither, we seem justified in inferring that kreatinin and not urea is a measure of tissue-katabolism. Obviously this is a matter of considerable consequence in the practical study of metabolic problems.

We have confirmatory evidence of this, in that the neutral sulphur (cystin) in the urine varies as the kreatinin on kreatin-free diets. Now oxidised sulphur indicates antecedent protein katabolism, or at least protein oxidation.

Physiologists have naturally inquired what is the significance of the difference between the large amount of kreatin in the muscle and the small amount of kreatinin (which may be regarded as derived from the kreatin) leaving the body. It is hardly likely that kreatin is a truly poisonous katabolite to be excreted at once, since so much of it is always present in the muscle. Kreatin, so far from being a "waste-product," seems, according to recent work, to be necessary for the full functional well-being of the motor nerve-endings on the muscle fibre. More technically put, kreatin would seem to play the part of a hormone for auto-activation of the neuro-muscular junction.

With regard to this precious nitrogen and its retention within the muscle in the form of kreatin, Professor Noël Paton has suggested that there is a reabsorption of some kreatin leaving the muscle, so that while there is a constant small loss in the form of kreatinin, there is a constant replenishing of the muscular store of kreatin. Such a process is not without analogy in the body, and the suggestion is worthy of consideration.

In closing my remarks, I can imagine some physiologically minded hearer asking me how it is that gelatin, a nitrogen-holding food, cannot replace ordinary protein as an article of diet. It may be pointed out that gelatin contains not only much glycocine, but both histidine and α-proline. It does, however, not contain glucosamine, serin, valin, cystin, tyrosine, or tryptophane. Undoubtedly these facts are difficult to interpret; why, if the imidogen forms of nitrogen are present in it, do they not become assimilated as they do in the case of ordinary protein digested? The reason would seem to be somewhat as follows: although certain assimilable nitrogen-holding substances are present, yet the absence of certain other substances deprives the total chemical complex of certain polypeptide unions in which alone the assimilable nitrogen can be conveyed into the living matter. That this is so seems proved by a very interesting experiment in nutrition carried out on himself by a worker Kauffmann. This worker first of all established nitrogenous metabolism in himself on a diet of casein; he then changed to a diet made up of 93 per cent. of gelatin, 4 of tyrosine, 2 of cystin, and 1 of tryptophane, which mixture contained as much nitrogen per cent. as the casein had done. On this he was able to remain for five days in nitrogenous equilibrium.

He, however, states that he felt a great disinclination for work during the gelatin period; this may have been due to the absence of still some other amino-acid (serin or valin) or to a deficiency of kreatin itself, thus failing to ensure the full functional efficiency of the peripheral nervous system. Myosin is the only protein which yields kreatin on autolysis.

The rate of the output of nitrogen is most curiously dependent on the functional integrity of the kidneys themselves.

In 1892, Dr. Rose Bradford of London discovered that if one kidney was excised and of the second there was left less than one-sixth of the total kidney-weight of the animal, there ensued a rapid wasting of the muscles with an enormously increased excretion of urea and water.

This great output of urea from the muscles is of course pathological; may it be that instead of kreatinin appearing as it does normally, urea is caused to arise from kreatin in the morbid katabolism which has been mysteriously set up? For it is known that in the laboratory urea can be obtained from kreatin by boiling the latter with a strong alkali.

Urea and sarcosine or methyl-amino-acetic acid are both obtained. It is by no means a far-fetched notion that in the highly depraved metabolism which the absence of the kidneys has entailed, the muscular kreatin is not only excreted in exaggerated quantity, but at the same instant broken down into urea and sarcosine.

In normal conditions it is now believed that urea never does so arise in the body: it may be quite otherwise in the highly abnormal state of partially nephrectomised animals.

We must content ourselves at the present time by merely saying that the normal renal tissue elaborates a hormone or internal secretion which exerts an inhibitory influence upon nitrogenous katabolism, and most conspicuously so in the striated muscular tissue.

Indeed, the clinician has already begun to explain certain cases of nephritis associated with an abnormally high nitrogen output by the kidneys as due to a diminution in the functional activity of this renal hormone.

Thus it is inevitable that in a still growing science the notions of yesterday should be modified to adapt themselves to the facts of to-day, and that the conceptions which suffice to-day will certainly not do so through the great to-morrow that is before us.

As in the sphere of ethics we make of "our dead *selves*," so in that of experimental science we make of our dead *theories*, "stepping-stones to higher things."

PROGRESSIVE OSSIFYING MYOSITIS IN A BOY ÆT. ELEVEN.

By Charles A. Adair Dighton, M.B., Ch.B.Ed., *House Surgeon, Peterborough Infirmary.*

(Plate V.)

Case.—The patient, a boy, æt. 11, was seen and examined on the 14th February 1908. The members of the family to which he belongs are all healthy. According to his mother's statement, the disease commenced after he had passed through attacks of measles, bronchitis, and whooping-cough, following one upon another between the ages of 4 and 5. His first complaint was one of general malaise and of weakness, this being most marked in the legs, so that the child was soon rendered unable to walk. Subsequently the muscles became stiff, and following the stiffness hard lumps formed in the muscles, and have increased steadily up to the present time. He has been twice an in-patient, first at the age of 5 and again at 6.

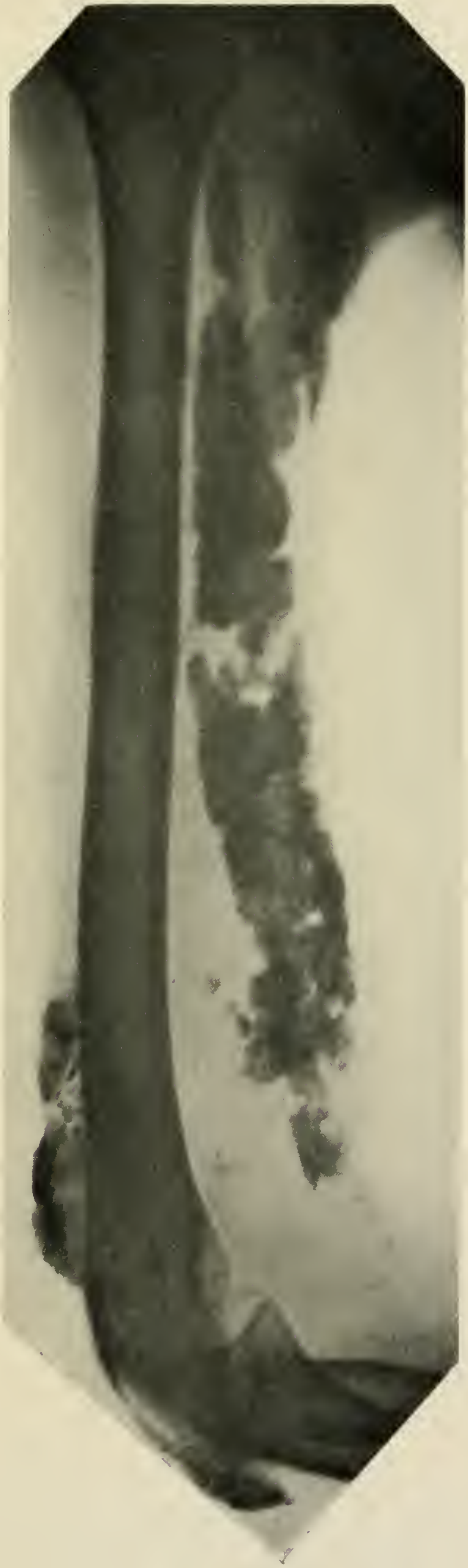
He is a weakly, undergrown boy, thin and drawn in the face, very nervous, and so tender to touch that it is very difficult to examine him satisfactorily. The chief complaint is that he walks on the balls of his toes, and that he has lost almost all power of movement at the elbow and shoulder.

In the arms there are large nodules of the consistence of bone in the biceps, triceps, coraco-brachialis and anconeus muscles, the biceps being almost completely converted into bone. The condition is still more pronounced in the case of the left arm, in which there is a large mass of bone in the triceps a little above the olecranon process. There is apparently no ossification in the muscles of the forearm on either side, but the muscles are wasted from disuse.

In the lower limbs the adductors are completely converted into bone, while the extensors and flexors are affected to a less degree. The condition is more marked in the left lower extremity.

In the abdominal wall on each side in the line of the fibres of the external oblique where they run downwards and inwards towards the pubes, there is a plate of bone about the size of a man's hand. The spinal muscles, those of the scapula and the pectorals, are unaffected.

The case is typical in the respects that the patient is of the male sex, that the disease commenced in early life, and that it is on the whole symmetrical. It is quite the exception, however, for the disease to have been in progress so long without affecting the muscles of the back, especially the trapezius and latissimus dorsi. So far as can be inferred from palpation of muscles and from the appearance of skiagrams, it would appear that the dark shadows in the position of the muscles are due as much to the deposit of lime salts in the interstitial connective tissue of the muscle as to the formation of true bone.



The skiagram of the left upper arm (Plate V.) shows a shadow in the upper part of the biceps, which is different and apparently of considerably older date than that in the lower part. The upper shadow shows an arrangement of plates and spicules which are obviously due to the presence of new bone, while the shadow in the lower part presents an appearance which suggests the deposition of lime salts. This would tend to support the contention of Krause and Trappe[1] that in many cases of ossifying myositis the deposition of lime salts is often met with as a preliminary to the formation of bone.

I am indebted to Dr. Collins, Junior Surgeon to the Peterborough Infirmary, for permission to publish this case, and to Mr. A. C. Taylor, Secretary of the Infirmary, for the X-rays photographs.

HEALTH RHYMES OF THE SEVENTEENTH CENTURY.

In a little book,[2] "The Psalmes of David in Metre according to the Church of Scotland, with a Table and Kalandar for XIX yeares, newly calculated, and made perfect, from the former errours, also, Morning and Evening Prayers, with sundry others for all Persons, and purposes," printed by Edward Raban for David Melvill at "Aberdene," 1632, are to be found this quaintly curious hygienic advice in rhyme, which I do not remember ever having seen commented on. It runs thus:

January.

Warm meats this mōth wil do thee goode
Whyte Wine likewise reviues thy blood ;
Let sweet drinke passe, if wise thou bee,
Bathe not, nor bleed, take that of mee.

February.

Now Agues in thy Bodie breede,
Beware of colde, bee choyse of feede :
Let Milke alone, beware of food,
If so thou doe, 'tis for thy good.

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[1] *Centralbl. f. Chir.*, Leipzig, 1908, January 11.

[2] 12mo. Bishop Dowden kindly informs me that this book is mentioned in Harry G. Aldis's "List" (p. 22), and says that the calculation of the Kalander for nineteen years (*e.g.*, Andro Hart's "The Psalmes of David," etc., 1611) seems to have been common.

MARCH.

Take physicke now, the time is good:
If health thou want, then let thee blood:
So shalt thou humors driue away,
Which earst have wrought thine owne decay.

APRIL.

Sweet *April*, with his often showres,
Maketh the Earth yeeld pleasant flowres;
Purge well therfore, 'twill doe thee good,
To ease thy bodie, cleanse thy blood.

MAY.

Walke now betime this month of *May*,
Amongst the Fields pleasant and gay;
To drinke with Sage I counsell still,
Which keepes the bodie from much ill.

JUNE.

Hot spice is naught, strong wines inflame:
Sweet meats are worse, much sleep the same;
What *Venus* sports doe Nature wrong,
Moyst cooling Foode reviues ere long.

JULY.

What pleaseth *June*, likes *Julie* best,
Cold Bathes they loue amongst the rest,
The Grasse that growes, to-morrow's Hay;
And Man that's now, as soon is Clay.

AUGUST.

Take little sleepe, and Medicine none,
The Dog-dayes now are comming on:
Goe pluck thy Fruits, yet leaue some store
For Gleanings due (God sayes) to poore.

SEPTEMBER.

Goates Milke as now hath wholsom bene
Beware of Fruits, new, ripe, or greene:
If Sicknesse bee, take counsell then,
Of such as bee right learned Men.

OCTOBER.

Prepare warme Cloathes, if thou be wise,
For health vse daylie exercise;
Drinke Wine that's olde, the rest let goe,
October willes the to doe so.

NOVEMBER.

Because of Rheumes, which hurt the head,
Beware of Bathes, let them bee fled;
Let *Venus* passe, content let serue
If that thine health thou would'st preserue.

DECEMBER.

Warm cloaths, good fire, prepare you must,
But use thou not excesse in lust:
Good Christmas keep, for poore men's sake,
And in thy CHRIST still comfort take.

A. FRANCIS STEUART.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

Rotunda Practical Midwifery. By E. Hastings Tweedy, M.D., F.R.C.P.I., Master of the Rotunda Hospital, and G. T. Wrench, M.D., late Assistant Master. London: Henry Frowde and Hodder & Stoughton.

We welcome the appearance among the *Oxford Medical Publications* of the "Rotunda Practical Midwifery," by the present able Master of the Hospital and one of his former assistants. The wonderful material afforded by the Rotunda Hospital practice forms a quite unique basis for a work such as this, and when interpreted for us and presented to us by such authorities as the writers of the present volume, it affords a book of exceptional value and in many ways of striking suggestiveness. The statistical tables of the Rotunda, as incorporated in the appendix, from statistics of the last three annual reports, show such excellent results that a book which clearly indicates the lines of treatment by which these results are attained, cannot fail to interest and instruct all obstetricians.

The authors; in their preface, justly condemn the present inadequate arrangements provided for the teaching of practical midwifery in the curricula of the universities and licensing corporations, and they go so far as to say that many recently qualified practitioners, "with considerable theoretical, but small amount of practical knowledge, are a danger rather than a help to their lying-in patients." Their aim in the book, while omitting all that is theoretical and not immediately useful to the practitioner, is to afford him a concise guide in the elucidation of the many difficulties of obstetrics. The book admirably fulfils these aims, and places before the reader a succinct and, on the whole, clear description of the Rotunda Hospital procedure. As a guide to the practical study of midwifery, the book may generally be regarded as good. It is full of sage advice and acute observation. It is as we would expect, and as, on the whole, perhaps practical teaching should be, somewhat dogmatic.

Amongst so much that is excellent, one cannot but feel that some portions of the book are too loosely expressed to make the meaning absolutely clear, unless to those fairly familiar already with obstetrics. This, and perhaps in parts a too colloquial style and some not overgrammatical expressions, we look forward to seeing amended in a subsequent edition, which we venture to predict will not be long delayed. One can only in a short review note a few points.

The chapter on the "Signs and Symptoms and Diagnosis of Pregnancy" is, on the whole, clearly expressed, and some of it is exceedingly good. Curious omissions are "Pseudocyesis," "Percussion," "Examination of the urine and care of the nipples during pregnancy." The chapter on the "Obstetrical Kit" could not be better. We are glad to see the importance given to the wearing of sterilised rubber gloves, and to the strong recommendation that normal labour should be conducted with as few vaginal examinations as possible. Great stress is therefore put, and rightly so, upon abdominal examination, and its value is strongly insisted on. An example of the excellent advice, rather crudely but graphically put, in the conduct of normal labour may be given : " Use lumps of wadding soaked in weak lysol, and wipe from before backwards, throwing away each lump after one wipe with it." One could wish that this had been more elegantly expressed.

We are surprised to observe that the puerperal patient is allowed to sit up on the bed-chamber on the third day to have her bowels moved. We question if that is safe advice. The authors strongly object to the term " inevitable abortion," on grounds which are scarcely convincing.

They place great faith in soap and water, and boiled rubber gloves. They consider truly that " antiseptics are a real danger ; if relying on their power, nurses or doctors slacken the care with which they clean their hands and their patients with soap and water, and their instruments by boiling." They believe in the use of soap for lubrication as being practically aseptic.

As is to be expected, accidental hæmorrhage receives very full recognition. It is stated that, next to sepsis, it is the greatest risk a pregnant woman runs. The Rotunda treatment by plugging is strongly advocated, and a good case made out for its adoption. We are glad to see that abdominal Cæsarean section and hysterectomy are condemned for this condition.

In the treatment of placenta prævia, no reason is given for the importance of bringing down one foot only in the operation of version. The toxæmia of pregnancy is dealt with most satisfactorily in chapter vii., and the results of their eclamptic cases (mortality of 16·4 per cent.) speak very favourably for the treatment which they adopt.

Part 3 deals with abnormal labour, but we would like to see the confusion which exists between "presentations" and "positions" rectified in the next edition.

While mentioning spontaneous evolution in transverse presentations, no mention is made of spontaneous version ; and we note that version is advised against in face cases, unless at the same time there is contraction of the pelvis. We would take exception to the extraordinary diagrams on p. 303 *et seq.*, showing the application of forceps. No woman could possibly lie in the position there indicated.

The teaching that uterine inertia is not an indication for forceps is extremely sound.

We note with interest the comparative rarity of contracted pelves in Ireland, and are amused to observe that what is often described as the "Irish pelvis" is extremely rare there. It would be interesting to know how the name originated.

Chapters on " Puerperal Infection," the " Insanities," and the " Care of the Baby " complete the book, which, but for some really minor defects, is a sound and excellent production, and we strongly recommend it as a safe and reliable guide.

Metabolism and Practical Medicine. By CARL VON NOORDEN. Vol. III. "The Pathology of Metabolism." By CARL VON NOORDEN, H. SALOMAN, A. SCHMIDT, A. CZERNY, H. STEINITZ, C. DAPPER, M. MATHES, C. NEUBERG, O. LOEWI, and L. MOHR. Edited by I. WALKER HALL. London: William Heinemann.

IN a previous review of the first and second volumes of this important work, we expressed our sense of its great value, as well as of the service Dr. Walker Hall has done in editing an English issue. The third volume only confirms the high opinion then formed. The topics which it discusses are among those of the greatest interest to physicians, and, as is stated in the preface, they are handled in greater detail than was permissible in the preceding volumes. The first article is on diabetes, by Professor Noorden, who begins by discussing the pros and cons of renal diabetes, the conclusion arrived at being that its existence as an independent disease is not yet established. Noorden's theory of diabetes is that along with the loss of power to katabolise carbohydrate there may also go failure of fat synthesis. In some persons the power of katabolising alone is lost, fat synthesis being retained. The body cells are bathed in fluids rich in sugar, hence fat is deposited. In such "diabetogenous obesity" there is no glycosuria, but "fat disease" masking the diabetes. According to such a view, we have—(1) Cases in which both fat synthesis and carbohydrate katabolism are lacking: ordinary diabetes with wasting. (2) Defective power of burning carbohydrate, with retention of the power of fat synthesis: obesity without glycosuria. These can readily develop into (3) defective carbohydrate katabolism and failing fat synthesis: obesity with subsequent glycosuria; diabetes of old persons, which may progress to (1). The rather plausible theory of pancreatic diabetes, according to which glycolysis was due to the combined action of a secretion of the pancreas and muscle juice, neither of these alone having any glycolytic power, is regarded as completely overthrown by recent researches in Noorden's laboratory. The author looks on the relationship of Langerhaus islands to pancreatic diabetes as still *sub judice.* In a very interesting discussion of ketonuria in diabetes, the point is brought out that notwithstanding many analogies between diabetic and physiological acetonuria, the parallelism is not complete. The relationship of the excretion of acetone and its congeners to the assimilation of carbohydrates is far less direct than in health. Lipæmia seems as much a mystery as ever. From the speedy disappearance of the fat poured into the blood by the thoracic duct, it is supposed that it must be rapidly altered in form by a ferment, and a feasible explanation is that in diabetes (perhaps from acidosis) this lipolytic action is interfered with. We were disappointed in finding only incidental reference to the "oat-cure" of diabetes, with which Professor Noorden's name is associated. Gout is the next disease to be discussed. Beyond the fact that the blood contains excess of uric acid, there is little that is certain. Haig's method of determining the uric acid content of the blood is dismissed as absolutely useless. Noorden explains uricæmia as due to a specific type of renal inadequacy, but admits that retention may also be determined by some abnormal combination of the circulating uric acid. He rejects the idea that variations in the alkalinity of the blood have anything to do with tissue deposits of uric acid, and does not look with any greater favour on Ebstein's well-known theory of local necrosis. Noorden also contributes a short article on obesity. The chief point of interest in connection with treatment is that underfeeding does not lead to loss of protein, as in normal subjects. The body proteins are apparently protected by the excessive fat. Next come chapters on the rarer disturbances of carbohydrate metabolism (pentosuria, etc.), on cancer, and on skin diseases, which are followed by Czerny and Steinitz's valuable essay on the "Metabolism of Children." They accept hyperchlorhydia as occurring in many cases of congenital hypertrophy of the pylorus. There is a certain plausibility in the suggestion, which would partially explain the frequency of the condition in breast-fed infants, on account of the low combining power of woman's milk as compared with that of the cow, but our impression is that the existence of excess of hydrochloric acid in all of these cases has not been definitely proved. Much of the metabolism of infants is dominated by the fact there is almost a positive N.-balance, even though the weight is falling. In ordering diets for infants, too little attention is perhaps paid to the question of caloric value, and therefore Heubner's rule of 100 to 120 calories per kilogramme of body weight is worth remembering. We found on comparing this figure with the amounts of milk given to infants thriving satisfactorily, a sufficiently exact correspondence. Acidosis is fully discussed, and the suggestion made that in some cases of marasmus with gastro-intestinal disturbance the sequence of events is:—Excess of fats; leading to withdrawal of larger quantities of alkali from the blood into the intestine in order that saponification may occur; relative acidosis. Sufficient retention of alkali appears essential to proper nutrition. After chapters on mineral waters and baths, there is an article by Magnus Levy on the ductless glands, in which myxœdema and exophthalmic goitre bulk most largely. Cystinuria, alkaptonuria, and other rare disturbances of protein metabolism are discussed by Neuberg, who also writes the chapters on oxaluria and phosphaturia. A long article on the influence of drugs on metabolism follows. Apparently the vexed question of the source of the fatty liver in phosphorus poisoning has been settled in favour of the "transference" hypothesis. Beesly's work in connection with delayed chloroform poisoning is quoted. The concluding chapters deal with the action of light, radium, and X-rays, with diabetes insipidus, nervous diseases, and diseases of the bones. The pathology of rickets is still obscure, but it is now settled that there is no failure in calcium retention, so that in all probability the fault lies in some inability of the bones to assimilate lime. An appendix contains a very complete list of food-stuffs, with analyses and caloric values. An error has, however, surely crept into the analysis of milk (p. 1294), which is said to have a protein content of 87·5 and a caloric value of 409·5 per 100 grms. In this, as in the previous volumes, the translation is well done. The editorial supervision of a work of this magnitude must have been a heavy task, but Dr. Walker Hall ought to feel that his labours have been well repaid in giving to the English-reading public a book which will for years remain a standard for reference and appeal in all questions concerning metabolism. It is a work which no scientific physician can afford to neglect.

The Borderland of Epilepsy. By Sir William R. Gowers. London: J. & A. Churchill.

Like everything written by Sir William Gowers, this little book will be read with the greatest interest and attention. Its subject is one of great obscurity, and even its author, who has a unique faculty for elucidating obscure nervous phenomena, has often to confess his inability to explain some of the symptoms he describes.

The substance of the book has already been published in the weekly medical journals in the form of lectures, but many who may have read one or more of them in this form will be glad to have them collected and made more accessible. The subjects he considers are all chosen because of their relationship, real or supposed, to epilepsy. They are based on notes he has taken of cases which showed some exceptional features. He has arranged them under five headings—fainting, vagal attacks, vertigo, migraine, and some sleep symptoms. Many of the cases described show the close relations that exist in them to epilepsy, as they have been mistaken by others for true examples of the latter. He also shows their close relationship, not only by heredity, but by their simultaneous occurrence or transformation in the same individual. In some cases the distinction must be exceedingly difficult to make, and must require the acute observation and subtle analysis of a Gowers. But, with the lucid exposition here given, the task should in future be easier. No doubt, too, the interest which reading this book is sure to stimulate in other observers will show itself in records of a similar kind, which may still further elucidate a difficult subject. One most valuable feature of the book is the attention paid to treatment of the conditions described.

The ordinary practitioner is thankful for all the aids he can get in helping him to a correct diagnosis, and he is still more thankful if he has also placed at his disposal the wide experience of treatment possessed by the specialist. For both these reasons, Sir William Gowers deserves the warm thanks of the profession for his interesting and valuable brochure.

Practical Fever Nursing. By Edward C. Register, M.D. London: W. B. Saunders Co.

It appears to be generally expected that the modern nurse should be highly educated not only in the practice of her profession, but also in the theory. How far the elaborately trained product of the nursing schools of to-day is in reality superior to her predecessor of ten years ago, is, in the opinion of some of us, a very open question. We fear, indeed, that the young woman who thoroughly assimilates the contents of the volume before us may be apt to prove a terror to the busy practitioner, who finds it difficult to keep quite up to date. If she does so, however, it will not be the fault of the author, who carefully lays down the relations which should exist between nurse and physician. Dr. Register commences his book with some admirable general advice to nurses regarding their practical duties. He has much that is useful to tell them concerning the ventilation of sickrooms, the prevention of bedsores, catheterisation, rectal feeding, and so on. The section on antipyretics and the use of cold baths, packs, and affusions is exceedingly good. That on disinfection and disinfectors strikes us as perhaps a little more elaborate than necessary, but it is interesting and very clearly written. A striking feature of the volume, indeed, is its extreme clearness. It will be readily understood and appreciated by those for whom it is written, and although its size is somewhat alarming, we cannot say that we have found much in it that can be considered superfluous. Following the general principles of nursing, which occupy the first portion of the book, comes a detailed account of each of the febrile disorders with which it treats. The chapter on typhoid fever is particularly good. It gives many valuable suggestions on dietetic points. It might well be read with advantage by many medical men. In the chapter on diphtheria we would have liked to see more stress laid on the risk of cardiac accidents and on the importance of keeping the patient absolutely recumbent. The question of diet might also have been touched upon. On the other hand, the insertion of the rules of the New York Health Department regarding prophylaxis has made a useful addition to this chapter. All the fevers seem to be most adequately treated, and the book has many illustrations, some perhaps more useful than others. The bacteriological illustrations might, we think, have been dispensed with, but we must admit their inclusion may add to the interest of the volume in the opinion of some nurses. Clearly printed, and on good paper, Dr. Register's work, though somewhat large for the ordinary nurse, would make an excellent prize for nurses' examinations, and should in any case be in the library of every hospital.

Blood Stains: Their Detection and the Determination of their Source. By MAJOR W. D. SUTHERLAND. London: Baillière, Tindall, & Cox.

WE congratulate the author upon the industry he has shown in preparing the admirable historical review of the various tests which have been suggested for the detection of blood. So far as we are aware, no such account has been published before in the English language, and even foreign literature does not contain a more complete and clearly expressed review of the whole subject.

As to the practical value of the book "for medical men, the Bench, and the Bar," we venture to express a doubt so far as regards the portion of the volume which deals with the microscopical, chemical, and spectroscopic examinations. This is too diffuse, and the ordinary reader must find himself lost amidst the multitude of tests described and the opinions expressed about them.

We wish that Major Sutherland, who has evidently acquired an extensive experience of the value of the various methods proposed, had drawn a sharper line between history and practice, and had given us a summary, in a separate chapter, of the best and most practical methods of examining blood stains in medico-legal cases. We fail to see the value of the long table of various methods which have been employed in the production of Teichmann's crystals, either historically or practically, while such a lengthy discussion of the measurement of corpuscles and the value to be attached to it in forensic cases, seems superfluous, when it is borne in mind that authorities have long since acknowledged its fallaciousness in this respect. There was the less reason also for this discussion since we now possess a much more reliable means of distinguishing the source of a blood stain, and the latter half of the book, which is devoted to this subject, we can commend most highly. The serological tests for blood stains are described in a manner which should be of the greatest assistance to those commencing the study of this difficult subject. This part of the volume is by far the best, and the author has done a service to English medico-legal literature by placing before us such a lucid description of the methods of serological diagnosis of blood stains.

This subject is as yet in its infancy, and constant advances in our knowledge are being made, so that we trust the public demand will necessitate many future editions.

The volume, notwithstanding the imperfections which we venture to think it has, will be found of the greatest assistance to those engaged in medico-legal work, and with a few alterations should become a standard book on the subject.

Text-Book of the Practice of Medicine. Second Edition. By Hobart Amory Hare, M.D. London: Henry Kimpton.

Professor Hare's book is really a text-book of the practice of medicine, and might with safety and success be that to which any young practitioner would turn for information and help in his practice. It is much more than a mere cram-book, to be got up for examination; not a system of medicine such as can only be written nowadays by a score or more writers; but a clear and lucid expression of an able clinician's long personal experience. As such, uncertain and debatable subjects have been largely omitted, the teaching is to a certain extent, and rightly, dogmatic. One fault, rather common to works of this size, has been avoided—treatment has not been cut down to a few very general statements; instead, methods are given in sufficient detail to be of immediate practical use. In a work of this nature, naturally the methods chiefly employed by the author are described most fully, and although many others might be equally good, or some (according to opinion) better, yet, if in any doubtful case those of the author are followed, we venture to think that the patient's interests will not suffer.

In this edition considerable additions have been made to the sections dealing with tropical diseases; skin diseases are not included in the work, for which we are thankful, for if we have any fault to find, it is in the weight of the volume—a two-volume edition would be much easier for the reader to handle. Although written for American students, the work should meet with a cordial reception on this side of the Atlantic on its own merits. We need only add (with regret that it is almost necessary) that it is written in English, not in an American dialect.

Bilharziosis. By Frank Cole Madden, M.D. London: Cassell & Co.

In this monograph the author gives a résumé of our knowledge, at the present time, of the pathological conditions produced by the presence of the *bilharzia* worm in the human body. Dr. Madden works in Egypt, and has a splendid field for the study of the subject, and with the pathological material in the School of Medicine in Cairo, prepared by his former colleague, Professor Symmers, he has succeeded in writing an excellent account of bilharziosis. This work is well illustrated by twenty-four figures, some of which show the large papillomatous masses which occur when the disease affects the rectum or subcutaneous tissues; conditions which are fortunately most uncommon in this country. The author believes that infection is probably by the penetration of the skin by the *miracidium*. The whole subject is considered in a graphic and interesting way, and at this time, when cases are not infrequently found in Britain, among those who have been in Egypt or South Africa, it is important for medical men to be conversant with the symptoms of the disease, and no better work on the subject than this can be obtained for the purpose.

Medical Lectures and Aphorisms. By Samuel Gee, M.D. Second Edition. London: Henry Frowde, Oxford Medical Publications.

The classics of medicine are not many, and this is one of them. This alone is reason enough for advising every medical man and student to read it, but there are others as well. It is full of clinical observations, imparted in the tersest, simplest style. It is so short that it may be read in one hour, though it will afford food for reflection for many. And, last but not least, it is literature. There are fourteen lectures in the book, of which nearly half are on nervous diseases, the others on bronchitis and asthma, enlarged spleen, peritonitis, and "sects in medicine." Of empirics Dr. Gee says: "This is the sect towards which I myself have the most kindly feeling, being led thereto by the hand of nature." And in a later paragraph on the faults of empirics he writes: "The empiric is essentially asystematic; he writes aphoristically, he is the ant which gathers facts but does not transmute knowledge." According to the last clauses of the definition we have many empirics, and they do not write aphoristically—would that they did. The volume should be read both for the sake of its matter and style.

NOTES ON BOOKS.

This is a new edition of Professor Herter's book — *Diagnosis of Organic Nervous Diseases*, revised and enlarged by L. Pierce Clark, M.D. (Putnam's Sons, London)—brought up to date by Dr. Pierce Clark. The scope of the work remains much the same. The title is altered, because it deals almost entirely with organic nervous disease, only one chapter being devoted to the distinction from "functional" diseases. The plan of the work is good; but Chapter viii. ("Illustrative Cases"), we think, might be omitted as unnecessary padding.

The illustrations are the weakest part of the book; a few are new, but the majority are old friends—too old, some of them, to be still on the active list. We mention this particularly, because the text is worthy of better illustration, and we can confidently recommend it for anyone who feels rusty in his diagnosis of nervous diseases.

This Manual—*Manual of Clinical Chemistry*, by A. E. Austin (D. C. Heath & Co., Boston)—is intended for students taking a course of practical physiological chemistry, and from the interpellation of many experiments throughout the text should serve its purpose well. But much of the information cannot be properly appreciated until the reader has some knowledge of pathological processes, and it will be found of equal if not of more value in doing side-room work in the hospital wards. The schemes for analysis at the ends of the various chapters are distinctly good; the illustrations are somewhat unequal in value, many are in colour and useful, but the same can scarcely be said of all the figures of instruments. The scales of the saccharimeter on p. 23 are very poor, and we think it would be advisable to add a note on the reading of Vernier scales. Under blood the only quantitative method given for estimating hæmoglobin is Tallqvist's, while the paragraph on the specific character of blood albumins is so scrappy that it would be better either omitted, or else so expanded as to be of some real use.

These are a few blemishes on a little work otherwise well fitted to the purpose the author had in view when writing—a clinical chemistry ignoring all which is not of direct benefit to the medical man.

This little book—*Cancer of the Stomach*, by A. W. Mayo Robson (James Nisbet & Co., London)—is stated in the preface to have been written by request, and the author's chief aim has been to make it practical and useful. In successive chapters there are shortly described the "Surgical Anatomy of the Stomach," the "Diagnosis of Gastric Affections," and the "Pathology of Gastric Carcinoma." It is perhaps to be regretted that the plates illustrating cancer are photographed from museum specimens showing conditions which are beyond the range of surgical interference. The methods of operating for the removal of cancer are well described, and most surgeons of experience will agree with the opinion expressed, that after resecting the pyloric segment of the stomach, Kocher's operation, when practicable, is the best of all procedures. When gastro-enterostomy is performed as a palliative procedure, the author repeats his well-known preference for the posterior operation; but, through an oversight, he describes the Mayo method, in which the jejunum is turned to the right—a method which was discarded by Mayo nearly two years ago. We hardly think that there was any call for the writing of this book, as it contains nothing that has not appeared elsewhere, and we have little expectation that it will add to the author's reputation.

Orthopedic surgery is a branch of surgery which has found special favour with our American confrères, and its progress owes much to their talent and industry. New York and Boston stands out as schools of orthopedics, which have long enjoyed a world-wide reputation, and in the former city there is no greater authority than Royal Whitman. This, the third edition of his treatise—*Orthopedic Surgery*, by R. Whitman (Henry Kimpton, London)—contains a great deal of new material, and many illustrations have been added. It is a comprehensive work of nearly 900 pages, thoroughly practical, and instructively illustrated, for the most part by photographs. We can thoroughly recommend it as a reliable and valuable guide to the practitioner whose aim it is to become proficient in this difficult branch of the healing art.

In striking contrast to the exhaustive works on surgery which have recently emanated from American surgeons, the *Manual of Surgery*, by Dr. F. P. Stewart of Philadelphia (Rebman Ltd., London), attempts to condense the subject-matter which the student must know within very small compass. So far as it goes, the information presented is, on the whole, accurate and modern; but we cannot avoid the feeling that the process of condensation has been carried so far as to defeat its own object. We are interested to learn that "the 'Scotch douche' is of service in low-grade chronic inflammation; it consists in pouring alternately hot and cold water upon a part. The heat relaxes and the cold contracts the vessels, which are strengthened by this form of exercise." We were not aware that Scottish surgery had the credit thus given to it. The illustrations, mostly borrowed, vary in their teaching value, but, on the whole, fall far below present-day demands.

Mr. Percy Sargent has embodied some of the results of his experience in the out-patient department of St. Thomas' Hospital in a small volume on *Surgical Emergencies* (Oxford Medical Publications, Henry Frowde, Oxford University Press). Within the limits the author has set forth a considerable amount of sound, reliable information; but we cannot but feel that it must all be within the knowledge of every educated practitioner, if not, indeed, of every intelligent student who has passed through his training in surgery. The reader who consults this book in a real emergency will often be disappointed. He will find, for example, that "it is beyond the scope of this work to follow out in any detail the treatment of individual fractures" (p. 37). But surely it is only "individual fractures" that constitute "emergencies." Nor will he find such instructions as are given regarding the treatment of fractures abreast of modern ideas. In the treatment of cellulitis, or of whitlow, we miss any reference to Bier's plan of treatment, which, revolutionary as it may be, can no longer be ignored. We regret that we are unable to think of any class of professional readers to whom this work will prove useful.

Since it first appeared, twenty years ago, Mr. Bowlby's *Surgical Pathology and Morbid Anatomy* (J. & A. Churchill, London) has been a standard student's text-book, and the fifth edition, which is now before us, will amply maintain its reputation. The work of revision has been largely entrusted to Dr. F. W. Andrewes, who has also contributed some new chapters. The text has been brought abreast of modern views; and a number of excellent new illustrations have been added. These add greatly to the value of the work, if at the same time they invite comparison with the older blocks, many of which fall far short of modern demands. We can confidently renew our recommendation of Mr. Bowlby's work.

A new edition, the fifth, of *Treves' Surgical Applied Anatomy* (Cassell & Co., London) has been revised and edited by Dr. Arthur Keith. The work of revision has been very thoroughly done; many new figures have been added, and a new feature has been introduced in the form of coloured illustrations. This manual has for long held a high place in the estimation of students, and the latest issue will only serve to enhance its reputation.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF
J. S. FOWLER, M.D., F.R.C.P.Ed.,
PHYSICIAN, ROYAL HOSPITAL FOR SICK CHILDREN.

Recent Work on Typhoid Fever.

At present the ideas which have prevailed for a number of years concerning typhoid fever are undergoing considerable modification. The two principal directions along which advances are being made are —(1) In showing that the disease is a general bacterial infection, and that the virus is kept alive through being harboured by apparently healthy people; and (2) in explaining the inter-relations of typhoid, paratyphoid, and certain forms of meat and fish infection.

As a starting-point we may take the fact that *the Bacillus typhosus is constantly present in the blood stream from the onset of an attack of typhoid fever.* Coleman and Buxton (*Am. Journ. Med. Sc.*, Phila., 1907, June) gave the results of the examination of 123 personal cases, and of 1479 culled from the literature. They used an ox-bile medium for their cultures, as advised by Conradi and Kayser (*vide infra*). Of the total 1602 cases, 75 per cent. showed bacilli in the blood. It is noteworthy that a positive result is most constantly obtained near the commencement of the disease; during the first week, in 89 per cent.; during the second week, 73 per cent.; during the third week, 60 per cent.; during the fourth week, only 38 per cent.—of cases examined. So many of the observers whose results have been tabulated found the bacilli present in approximately 100 per cent. of the patients examined, that the conclusion can scarcely be avoided that the bacilli are present in the blood of every case of typhoid, failure to detect them in the minority of cases being due to bad technique. Every observer has noted that the bacilli disappear with the fall of temperature. Coleman and Buxton believe that the organisms enter the lymph glands and spleen, whence they reach the blood; it is doubtful, however, whether they actually multiply in the blood stream. The symptoms of the disease are caused by the destruction of enormous numbers of the bacilli in the blood and the liberation there of their endotoxins. When the endotoxins are set free elsewhere—*e.g.*, in a typhoid abscess—the symptomatology is not that of typhoid fever. This conception is also borne out by the analogy of paratyphoid fever (*vide infra*). *B. paratyphosus* may infect the bowel and cause acute gastro-enteritis; when it invades the lymphatic organs, it produces a disease clinically identical with typhoid fever.

Relation of bacillæmia to the course of the disease.—As the temperature falls to normal the bacilli vanish from the blood stream; they bear no relation to the type or severity of the infection except as regards their number. The writers found them in cases which lasted only ten days, and as late as the twenty-seventh day in a case of long duration. The bacilli are found in the blood in 90 per cent. of relapses. Relapses, therefore, are due to reinvasion, but Coleman and Buxton assert that "A relapse is not due to reinfection with the bacilli from the intestine as the result of intestinal trauma brought about by dietetic irregularities." Bacilli can always be found in the blood before the Widal reaction can be determined. The conclusions of the writers, additional to the facts summarised above, are—(1) The bacillæmia of typhoid is not a true septicæmia, but an overflow of bacilli from the lymphatic organs. (2) The endotoxins are not cumulative, and convalescence is established within a few days after the bacilli disappear from the blood stream. Incidentally it may be mentioned that if the views in this and the following papers be correct, the employment of intestinal antiseptics in the treatment of typhoid would appear to be quite useless.

A number of very important researches have been carried out in Strasburg under Förster's guidance, and his paper on "The Relationship of Typhoid and Paratyphoid to the Biliary Passages" (*München. med. Wchnschr.*, 1908, January 7) is a very valuable one. Two leading facts recently established are that in typhoid patients the bacilli are regularly excreted with the bile into the bowel, and that bacilli which are excreted by the liver into the bile can enter the gall-bladder and go on growing there. The first of these facts renders intelligible several matters whose significance was formerly obscure. It is commonly accepted that infection with typhoid occurs through bacilli being swallowed, multiplying in the bowel, and then passing through the intestinal wall into the blood and lymph stream. But on this hypothesis it is difficult to understand why typhoid bacilli cannot be isolated from the stools at the outset of the disease, and are only present in them after the first week. Förster and his assistants Conradi and Kayser have shown that the bacilli can always be detected in the blood during the first days of the fever, and even in some cases during the incubation period: that is to say, bacilli can sometimes be cultivated from the blood of an apparently healthy person who has been in contact with a typhoid patient, and has not yet sickened of the disease. And even before bacilli themselves can be recognised, Fornet has shown, by means of a precipitin test, that their products are present. A new conception of typhoid infection must therefore replace that now in vogue. Typhoid bacilli do not develop in the bowel, but first penetrate the tissues of the body—perhaps by the pharynx—and multiply there. At or before the onset of the initial symptoms, or very soon afterwards, they appear in the blood and pass over from the liver into the bile. Thence they enter the bowel and gall-bladder, causing a variable degree of cholecystitis in the latter structure. In the bowel some die, some are expelled in the stools—probably they do not multiply. On post-mortem examination the bacillus is constantly to be found in the duodenum, rarely in the lower part of the ileum, and never in the rectum. Förster's observations suggest that they are only found in the stools when they are unusually numerous in the bile, or when the intestines quickly evacuate their contents. Thus are explained the absence of the bacilli from the motions in the early stages of typhoid; the varying frequency with which, at a later stage, they are found from one day to another; and the fact that only when ulceration is established are they constantly to be discovered. The conditions as regards paratyphoid are very similar; under certain circumstances, however (*vide infra*), the growth of the organism is mainly localised in the bowel.

The second important discovery in connection with typhoid is that *the bacilli which enter the gall-bladder flourish luxuriantly there.* Their growth is especially favoured when a slight degree of cholecystitis is set up, and this is wont to occur. After the patient's recovery, the organisms tend to perpetuate their existence on this site, and are excreted into the bowel by the bile; such cases are spoken of as "bacilli carriers." Förster divides bacilli carriers into two classes: those who get rid of the organisms in a few weeks, and those who harbour bacilli for months and it may be years. The latter are "chronic bacilli carriers." Förster and his assistants have discovered persons who five, ten, even twenty years after recovery from typhoid regularly excreted Eberth's bacilli by the bowel. Chronic bacilli carriers are not very numerous, forming about 2 to 3 per cent. of all patients; probably if cured patients could be repeatedly examined the percentage would be higher. Temporary bacilli carriers are fairly uniformly distributed among patients of different ages and sexes, but chronic bacilli carriers are not. Of 173 persons who were found excreting bacilli for periods of from one to thirty years, 77 per cent. were women, 17 per cent. men, and 4 per cent. children. The relative proportion of females to males (3 or 4 : 1) is very much the same as in gallstone disease. It is not improbable that there may be some relation between the two facts. Blümenthal Levy and Kayser have detected both typhoid and paratyphoid bacilli inside biliary calculi. This prolonged infectivity of the gall-bladder is, of course, highly important in connection with the spread of the disease. During the eighteen months January 1906 to June 1907, 386 cases of typhoid were systematically investigated from this point of view, and in seventy-seven cases the patients were shown to have been in more or less close contact with chronic bacilli carriers. Hence in sporadic cases of typhoid, particularly, a search should be made for such persons, and anyone who shows signs of disease of the gall-bladder ought especially to be suspected of harbouring bacilli. The discovery of these chronic bacilli carriers is facilitated by the fact that most of them give the Widal reaction. The control of typhoid fever, therefore, involves—(1) Detection of these persons. (2) When the dangerous persons are discovered they must be instructed as to the special need for cleansing the hands, for care in cooking, and for disinfecting the motions. (3) When there is evidence of gall-bladder disease, the organ should be removed. Förster has seen cases in which cholecystectomy has checked, and others in which it has failed to check, the excretion of bacilli. (4) The problem of disinfecting the bile, apart from operation, is an as yet unsolved riddle. Intestinal antiseptics, attempts at active immunisation, and cholagogues, have so far failed.

It seems possible that Chantemesse's method of the *oculo-diagnosis of typhoid* (*Deutsche med. Wchnschr.*, Leipzig, 1907, No. 39) may be of assistance in recognising bacilli carriers. He uses a dead culture, and in twenty-four hours gets a reaction similar to the now well-known tuberculin reaction. The oculo-reaction for typhoid, however, has not yet secured the same assured position as has Calmette's test.

Typhoid and paratyphoid fever.—This difficult subject is reviewed by Staübli (*Cor.-Bl. f. schweiz. Aerzte*, Basel, 1907, November 15). He points out that for the bacteriologist the dominating factor is the nature of the bacillus present, but that the position of the clinician is more difficult. In considering the evolution of the modern conception of typhoid fever, it must be remembered that originally the disease was a clinical and pathological grouping of symptoms, the etiology of which was unknown. Eberth's discovery of the bacillus raised this symptom group to the position of a specific infectious disease, caused by the entry into the body of a specific organism. The absence, however, of any absolutely diagnostic sign, and the inconstancy of the symptoms, led to renewed search for some pathognomonic character, by which a certain diagnosis could be arrived at. This search gave us in succession the diazo-reaction and the leucopenia; while later came the recognition of the bacilli in the blood stream, which, occurring at a time when other signs are absent, occupies an unrivalled place among the diagnostics of the disease. As signs of the general infection, the agglutination test, and later, fixation of the complement, came into vogue, with the result that erroneous diagnoses are now rare. The fact that the bacilli appear so early in the blood removes typhoid from the category of local infections to that of general infective processes—a bacillæmia. Typhoid bacilli may, however, set up various suppurative processes, *e.g.*, meningitis, in which case the infection is local, and the general signs absent. Bacteriology has further shown that what is clinically typical typhoid may be due to some organism other than *B. typhosus.* This was first described in 1896 as "paratyphoid," and since then the bacilli have been divided into two or more groups, of which paratyphoid A and B are the chief. Infection with them occurs sporadically, and also in epidemics; the symptoms are on the whole milder than in ordinary typhoid. In these cases agglutinins appear, but are not strictly specific for the bacillus giving rise to them, hence a positive Widal may be obtained. It is, therefore, impossible to establish a clearly defined species of disease as "paratyphoid." The various bacilli identified as causing such cases differ considerably from each other, and moreover some paratyphoid bacilli closely resemble those which give rise to certain forms of meat poisoning. Meat poisoning occurs under three main forms—(1) Botulism, in which nerve symptoms predominate, due to *B. botulinus*, a non-pathogenic anaerobe which gives rise to toxins in preserved meat, sausages, etc. (2) Acute diarrhœa from putrid meat due to *B. proteus.* (3) Meat infection due to the presence in fresh meat of *B. enteritidis* of Gaertner. It is this which is so analogous to *B. paratyphosus*. It may produce a disease identical with typhoid, or an acute choleraic gastro-enteritis, or it may in some cases produce first the latter, then the former. In many cases of meat poisoning the *B. paratyphosus* has been found, and a number of observers regard it as the same as *B. enteritidis*. In some epidemics of meat poisoning the resemblance to typhoid has been very great, and Eberth has drawn attention to the identity of the post-mortem findings.

Brion and Kayser, discussing the *nosology of typhoid* (*Deutsche Arch. f. klin. Med.*, Leipzig, Bd. lxxxv. S. 552), conclude that it is not an etiological entity. A classical case may equally well be due to Eberth's bacillus, either of the paratyphoid bacilli, bacilli of the meat-poisoning group, or a *pyocyaneus* infection. It is a true septicæmia, or may remain localised in the gall bladder or elsewhere. The present clinical conception should be that of a group of diseases, which doubtless we shall be able in the future to differentiate.

Arzt and Boise (*Wien. klin. Wchnschr.*, 1908, No. 7) fully report the bacteriology of two cases of paratyphoid meningitis in infancy; the investigations showed that a genuine bacteræmia, probably arising from the alimentary tract, had occurred.

SURGERY.

UNDER THE CHARGE OF

ALEXANDER MILES, M.D., F.R.C.S.Ed.,

LECTURER ON SURGERY, SCHOOL OF MEDICINE, EDINBURGH.

The Surgical Treatment of Emphysema of the Lung.

Passler and Seidel (*Centralbl. f. Chir.*, Leipzig, 1907, November 2) report a new case in which Freund's operation has been performed for emphysema of the lung. The right costal cartilages, from the first to the fifth inclusive, were resected in this case, and the improvement in the patient's condition was so marked that he was able to resume his occupation. The authors recommend that a portion of the first rib should be removed along with the cartilage. The operation, which is neither difficult nor dangerous, should be performed at the stage when dyspnœa occurs on moderate exertion. It may even prove beneficial when already there is secondary cardiac insufficiency.

Steida reports a case in which the patient suffered from emphysema with rigid enlargement of the thorax. Following Freund's advice, he resected on both sides, removing portions of the second, third, and fourth costal cartilages, 2 to 3 cm. in length, together with the perichondrium. Before the operation the thorax was almost completely rigid, with immobility of the lung margins; ten weeks after the operation there was a distinct respiratory movement of the thorax, with mobility of the lung margins. He advises that the operation be done before there are any secondary changes in the heart. Kraus considers that cases with rigid thorax are those most suitable for the operation, and he confirms the remarkable improvement which follows. Seidel lays special stress on the removal of the first rib, which is taken away piecemeal with forceps. The cases, however, must be carefully selected. In performing the operation, care must be taken not to injure the adjacent parts, and particularly not to cause pneumothorax.

FAT EMBOLISM AFTER ORTHOPÆDIC MANŒUVRES.

ABERLE reports (*Centralbl. f. Chir.*, Leipzig, 1907, June 22) a series of four cases of fatal fat embolism after forcible correction of deformity at the knee, and one after wedge-shaped resection of the tarsus. In three cases he had the opportunity of observing the effects of the fat embolism on the operating table. There were two phases rapidly following on one another: first, arrest of breathing and deep cyanosis, due to involvement of the lung; and then brain symptoms, in the form of loss of the pupillary reflex, fixation of the pupils in complete contraction, convulsions, and deepening coma.

The factors influencing the occurrence of fat embolism are: the quantity of fat which gets into the circulation, the rapidity with which it enters, the importance to life of the organ affected, and the disposition of the patient. Persons with marked contractures resulting from paralysis or articular rheumatism, with pronounced atrophic changes in the bones of the extremities, are particularly liable to be the subjects of fat embolism, especially if they have passed the age of fourteen. Children are less liable, because the red marrow is not changed into yellow marrow till puberty. The more frequent occurrence of fat embolism from injuries of atrophied bones is due to the fact that in these the marrow spaces are enlarged and entirely filled with fat, which is taken up through the wide venous capillaries of the marrow. The author therefore advises against attempting to correct deformities completely at one sitting in such cases, and in extreme cases he prefers osteotomy to forcible correction.

Vulpius refers to two cases of fat embolism in children under ten years of age; and Lorenz emphasises the risk of attempting to correct deformities in patients who have been so crippled as for years to have been compelled to use a Bath chair or crutches.

DIASTASIS OF THE VERTEBRÆ.

UNDER the term of vertebral diastasis Bertein and Worms (*Rev. de chir.*, Paris, 1908, February) differentiate a traumatic lesion characterised by—(1) Separation of the vertebræ, with complete, or almost complete, rupture of the ligaments, but without displacement of the articulations; and (2) invariable gross lesions of the spine, which usually prove fatal. This injury is to be distinguished from mere sprain of the spine, in which the main incidence of the force falls on the ligaments, and dislocation, in which the articulations are involved. It is produced in the great majority of cases by forcible flexion of the spine forward, and much the commonest seat of the lesion is the lower cervical region. In addition to the tearing of the ligaments, the intervertebral disc is usually split, so that one half of it adheres to each of the vertebræ implicated; this lesion distinguishing a diastasis from a dislocation, in which the disc adheres to one vertebra or the other. The cord is, as a rule, seriously damaged, being softened to a greater or less depth, and in many cases transformed into a red pulp. The membranes are also torn, and a certain degree of hæmatorrachis may result. The damage to the cord is evidently the result of its being forcibly stretched.

The patient may suffer from a profound degree of shock, but does not lose consciousness; there is complete paralysis of the lower extremities, and to a less extent of the upper extremities. Loss of sensation is coextensive with the motor paralysis. Priapism is frequent. The head and neck can be moved without much pain. There is no displacement, depression, or other deformity to be detected on examining the bones either from behind or through the mouth. The prognosis is always very grave, the patients seldom surviving more than two or three days. As the cord is completely disintegrated, nothing can be done in the way of treatment.

Pain in the Back in Cancer of the Breast.

Delore and Ballivet (*Rev. de chir.*, Paris, 1908, February) report a series of cases of cancer of the breast from Poncet's clinique, in which intense pain radiating to the back in the inter-scapular region was a prominent feature. This symptom gave rise to the suspicion that metastasis had taken place to the vertebræ. In the absence of physical signs of spinal involvement, however, the breast was excised, and the axilla cleared in each of these cases, with the result that the pain in the back disappeared. In each case it was found that the glands in the subscapular region showed a marked degree of enlargement, and that the infected glands were closely related to the subscapular nerves, and that the branches supplying the latissimus dorsi and the teres major and minor muscles were so completely surrounded by the masses of enlarged glands that they were only freed with difficulty. As these are mixed nerves, the authors explain the pain in the back to their being compressed and irritated by the cancerous glands, and the practical bearing of their paper is to show that even intense and persistent pain in the region of the spine is not necessarily an indication that metastasis has taken place, and that by a thorough exposure and clearing of the axilla the cause of the pain may be removed.

Differential Leucocyte Count in Appendicitis.

From a careful study of seventy-two cases of appendicitis in which a blood count was made immediately before operation, and in which the pathological condition could be compared with the results of the count, Noehren (*Ann. Surg.*, Phila., 1908, February) comes to the following practical conclusions:—The blood examination is of great value in determining the severity of the condition, and in deciding whether or not immediate operation is indicated. The *degree* of leucocytosis is too variable to be of practical value, but the estimation of the *percentage of polymorphs* is more reliable. A polymorph percentage of 90 per cent. or more indicates a severe process that needs immediate operative interference; a percentage below 78 per cent. means a "safe" or mild process; a percentage between the two extremes speaks for the one condition or the other, according as it approaches the one extreme or the other.

Control of Intestinal Contents of Inguinal Colostomy.

To avoid the irritating effects of the bowel contents on the skin after inguinal colostomy, L. F. Garrigues (*Am. Journ. Surg.*, N.Y., 1908, January) suggests a modification of the inguinal operation, based on the principle of Frank's operation of gastrostomy. An incision is made, 3 in. in length, through the left linea semilunaris at the level of the superior iliac spine, into the peritoneal cavity, and a loop of the colon pulled out. A second incision, about 2 in. in length, is made about 2 or 3 in. outside of the first incision, and the subcutaneous tissue and skin are undermined between the two incisions; the exact position of the second incision depending somewhat on the length of the mesentery, as the mesentery should be put gently on the stretch. A running suture is inserted between the peritoneum and deep fascia on the one hand, and the muscular layers of the intestine on the other, at the base of the loop of intestine that has been pulled out. The intestine is now drawn through from the first to the second incision underneath the bridge of skin and subcutaneous tissue. A running suture is inserted, uniting the skin and the end of the loop of intestine to the second incision. The skin and subcutaneous tissue of the first incision are now sutured. The intestine is opened in the second incision if the case is an urgent one, but, if possible, twenty-four hours should be allowed to elapse before the intestinal incision is made.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF
F. W. N. HAULTAIN, M.D., F.R.C.P.Ed.,
PHYSICIAN FOR DISEASES OF WOMEN, DEACONESS HOSPITAL, EDINBURGH;
AND
J. A. C. KYNOCH, M.B., F.R.C.P.Ed.,
PROFESSOR OF OBSTETRICS AND GYNÆCOLOGY, ST. ANDREWS UNIVERSITY.

Use of Adrenalin in Osteomalacia.

Puppel (*Centralbl. f. Gynäk.*, Leipzig, 1907, No. 49) describes two cases of osteomalacia giving rise to similar symptoms but differing in their reaction to suprarenal preparations. One of the cases was confined to bed, the other could not move from her chair. A solution of 1 : 5000 was injected twice weekly. The first patient treated had been twice pregnant. She was in very poor circumstances, and was obliged to be in bed from the third month of her second pregnancy. Phosphorus and salt baths had no effect on the disease. The injection of 1 c.c. of the above solution caused vomiting, palpitation, shivering, and præcordial anxiety; but twenty-four hours later the patient was able to get out of bed without assistance. She had three injections, which cured the condition. The second case was an viii-para, æt. 34. The pelvic deformity was so great as to necessitate Cæsarean section. The effects of the injections were exactly the same as in the first case, but there was no improvement on the osteomalacia. Puppel concludes that though adrenalin may be tried in this disease, yet the treatment in general remains the same, namely, phosphorus, cod-liver oil, salt baths, and castration.

Instrumental Perforation of the Uterus during Abortion.

Orthmann (*Berl. klin. Wchnschr.*, 1907, December) describes three cases of this accident, associated with injuries of the intestines. In the first case there was a slight lesion of the intestine and a tearing of the mesentery, which had been accidentally caught by abortion forceps. Twenty hours later cœliotomy was performed. The intestinal lesion was closed, and the uterus along with the left tube resected. In the second case the intestine was torn for a distance of 7 cms. The intestine was resected and the uterus amputated. In the third case the uterus had been perforated with a curette, and the intestine was torn. Resection of the intestine and total extirpation of the uterus was necessary. Death occurred in four days from peritonitis. Orthmann gives the following as the chief causes of this accident. Pathological conditions of the uterus due to inflammatory lesions, causing the uterine wall to become very soft, the use of improper instruments and faulty technique in the removal of the ovum and membranes. All sharp instruments should be discarded in treating a patient during abortion. The fingers are the least dangerous instruments to use in such cases, and the abortion forceps should only be used to remove loose portions of membranes.

Cystitis in the Nursing Infant.

Caccia (*Arch. de méd. d. Enf.*, 1907, December) states that cystitis in the nursing child is generally the result of infection by the *Bacillus coli.* Gonorrhœal infection is rare. A simple cystitis may occur as the result of faulty alimentation, or irritation by internal medication. The bacillus must enter the bladder from the urethra, and be eliminated by way of the kidney, or pass from the intestine to the bladder through the tissues. The symptoms are, fever of an irregular type, pain, shown by crying, nocturnal enuresis and polyuria. The urinary reaction is always acid. In the treatment of this condition, Caccia recommends helmitol, which liberates formol which is eliminated by the urine. After the acute stage it may be necessary to wash out the bladder with protargol.

Acute Torsion of the Pedicle of a Hæmatosalpinx.

Stratz (*Centralbl. f. Gynäk.*, Leipzig, 1907, No. 46) reports the following case :—Patient, æt. 36, had been delivered of her third child twelve years before coming under observation. Menstruation regular and profuse. She complained of intense pain in the right side, with profuse hæmorrhage, and she attributed those symptoms to over-exertion.

Vaginal examination revealed a very tender swelling anterior but close to the uterus on the right side. The uterus was enlarged; the left appendages were normal. Laparotomy showed the omentum to be very adherent to both uterus and tumour. The latter was bluish in colour, and consisted of ovary and tube greatly enlarged and twisted. During removal the tumour burst, and some clotted blood escaped. In association with the clinical course, Stratz considers the case to have been an example of hydrosalpinx, giving rise to no symptoms till acute torsion of the pedicle led to the formation of a hæmatosalpinx.

Tubal Abortion with Eversion of the Tube.

Falk (*Centralbl. f. Gynäk.*, Leipzig, 1907, No. 45) reports the following case:—Patient, 2-para, æt. 23, was suddenly seized with symptoms of internal hæmorrhage, which was diagnosed as due to secondary rupture of the tube after tubal abortion. At the operation it was found that there was no rupture but very considerable eversion of the tube. The case supports the theory that the expulsion of the ovum in tubal abortion is due to contractions of the tubal musculosa, and not to be explained by any mechanical factors.

Maternal Mortality in 5000 Obstetrical Cases at the Johns Hopkins Hospital.

Goldsborough (*Johns Hopkins Hosp. Bull.*, Baltimore, 1908, January) divides this series of cases into the following groups:—

1. *Infections.*—This group includes the most frequent cause of death. The number of cases is twenty-one, or 38·18 per cent. of the entire series, from which it follows that in the 5000 cases the gross mortality from the infections was 0·42 per cent. Twelve of the cases were infected before admission to hospital, one was not examined, while in two there had been frequent vaginal examinations made by midwives. Thus six cases remain in which the department was responsible for the fatal infection.

2. *Toxæmias.*—There were sixteen deaths, divided as follows: eclampsia, twelve; nephritis, two; toxæmic vomiting of pregnancy, two. The mortality from eclampsia was 25 per cent.

3. *Hæmorrhages.*—Eight deaths. Four of these were due to placenta prævia, and in three of them the patient was moribund on admission. In one case death was due to incomplete rupture of the uterus.

4. *Miscellaneous.*—Ten deaths, distributed as follows:—(1) Intestinal obstruction, three; (2) typhoid fever, one; (3) pneumonia, one; (4) dysentery, one; (5) thrombosis, one; (6) embolism, one; (7) goitre, one; (8) anæsthesia, one. There were fifty-five maternal deaths in the 5000 cases, representing a gross mortality of 1·1 per cent.

Cæsarean Section.

Leopold (*Arch. f. Gynäk.*, Berlin, 1907, Bd. lxxxi. Heft 3) reviews 229 cases of this operation in order to ascertain if hebotomy would modify the procedure in any of the cases. Two hundred of the cases are carefully studied. The conservative operation was performed in 134 cases; while Porro's modification was followed in sixty-six cases. In 188 cases the indication was pelvic contraction; of those the indications were relative in 132, positive in 56. The mortality in the series was 7·5 per cent. In 52·9 per cent. there was no fever during the puerperium; eighty-six infants were born alive, eleven died in the course of delivery, and seven died within three weeks. Thus 88 per cent. of the infants left the hospital well. Leopold thinks that in private practice, if all the indications permit of it, hebotomy is to be preferred. In certain cases of intra-uterine infection the author prefers Porro's operation, although he thinks that in private the practitioner is justified in perforating the living child. He has been able to follow the histories of forty-seven infants delivered by Cæsarean section. Of these, nine were living after an interval of eight years. Of the Porro operation the history of twenty-three infants out of thirty-seven has been obtained. Of these twenty-three, seventeen are still alive after a period of eight years.

THERAPEUTICS.

UNDER THE CHARGE OF

RALPH STOCKMAN, M.D., F.R.C.P.Ed.,

PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY;

AND

FRANCIS J. CHARTERIS, M.D.,

ASSISTANT TO THE PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY.

Alcohol Injections in the Treatment of Facial Neuralgia.

In the course of sixteen months Kiliani has treated fifty-five cases on this plan, with only three failures. The treatment consisted in injecting 80 per cent. alcohol either into the foramen through which the respective branch emerges into the face, or, if necessary, into the foramen ovale or rotundum. The quantity injected is about 2 c.c., and, according to Kiliani, there is no difficulty in reaching all the foramina with a needle. The injections were done without any anæsthesia, either local or general. The needles used were rather blunt, and their introduction into the foramen is rather painful, and the slow injection of the alcohol still more so; but neither is beyond the endurance of the patients. A successful injection produces within a few minutes a burning or benumbing sensation within the region supplied by the nerve injected. This develops, sometimes after a severe period of pain lasting for two or three hours, into a more or less pronounced anæsthesia. The injection may produce a swelling, which in the case of the first and second branch causes swelling of the eyelids, and in the third a slight trismus. Nearly every injection into the infra-orbital foramen produces a slight facial paresis, which passes off within fourteen days. Injection through the foramen ovale or rotundum into the root of the second and third branch should at once produce a complete anæsthesia in the region of the nerve attacked. In the first branch, the number of injections necessary to produce freedom from pain varied from two to four; with the second branch, from four to sixteen; with the third branch, from two to five; while the time occupied to get the patients free from pain varied from three days to five weeks. The cases treated were severe types. All had received previous treatment. In twenty-two, operative interference had been tried without success, while four had even had the Gasserian ganglion excised without benefit. Kiliani claims that the method of treatment is quite safe in experienced hands. Though it does not any more than other methods prevent relapses, it has the advantage that it can be readily repeated if required. Such recurrences have been noted about a year after the injection, but so far Kiliani has only experienced one recurrence.—*Med. Rec.*, N.Y., 1908, January 18.

Treatment of Pneumonia.

Gilman Thomson advocates the open-air treatment in pneumonia. He refers to forty-seven successful cases of pneumonia which received no medicinal treatment whatever, except regulation of the bowels. These patients were for the most part treated with good fresh outside air throughout their entire illness. They were placed either upon the open roof, or in small rooms where artificial means of ventilation were excluded, and the beds were kept all the time beside widely open windows. The effect of such fresh-air treatment is marked. The patients require less nursing, as they are less restless and less delirious, and sleep much better, while they seem much clearer mentally. He does not claim that the open-air treatment is always curative, but it often is, and the advantages enumerated are constantly obtained. Delirious patients soon become much quieter, sleep better, and the cyanosis diminishes. Less stimulation is needful for alcoholic cases. The treatment should not be tried in certain cases of very old people, marasmic children, or patients with very weak hearts, *i.e.* in asthenic cases, with low temperatures; but even in these types benefit is usually got from a plentiful supply of good fresh air. Such patients, of course, may require ordinary symptomatic treatment in addition to the fresh air, but it will be found that much of it is rendered unnecessary by the simple plan of giving the patient plenty of fresh, free, flowing air. During the exposure to the open air the patient is wrapped up, as is ordinarily done with tuberculous cases undergoing open-air treatment, with extra blankets, hot bottles, and a woollen hood closely enveloping the head.—*Am. Journ. Med. Sc.*, Phila., 1908, January.

The Danger of Arsenic in Chorea Minor.

Koplic considers that the indiscriminate use of arsenic in chorea minor is not justified. It is both dangerous and futile. He holds that chorea is an infectious disease of self-limited duration. In addition to its well-known effect of producing irritation of the stomach, swelling of the eyes, pigmentation, and neuritis, Koplik finds that arsenic irritates the kidneys. This action is produced very readily, and may precede any other sign of intolerance. It is first shown by slight albumin in the urine. If the administration is continued, this is followed by the passage of casts and blood cells with the urine. He considers that the urine gives us the most delicate test of the tolerance of arsenic. He protests against the usual routine plan of treating mild cases of chorea with increasing doses of Fowler's solution. It is much more rational to treat them with a modified rest cure, and the avoidance of all excitement and strain. Such patients do well with mild hydropathy, warm baths, and lots of rest in bed. The patient should go to bed early, rise late, and then he may indulge in a quiet way in the ordinary duties of childhood. In the afternoon he should rest an hour. Before rising in the morning the patient should have a warm bath, followed by a rub down with cold water, and a further rest in bed for an hour before getting breakfast. Mild cases require no drug treatment. If such is needed, a sedative, such as trional or choretone, is more satisfactory than arsenic. Moderately severe cases, when there is some mental disturbance, moroseness, melancholy, or outbursts of temper, should be confined to bed, but should not be isolated completely, as even here a little play is good for the child. When there is cardiac involvement, Koplik prefers not to give arsenic at all, as he believes that it aggravates the cardiac condition. He finds a sedative to promote sleep, and strychnine as a general tonic, the best treatment combined with hydrotherapy. The patient in the morning is given a pack at 100°, and this temperature is gradually reduced by the addition of cold water, after which the patient, pack and all, is wrapped up in a warm blanket for fifteen minutes. The pack and blanket are then removed, and the child is rubbed down with cold water. Only in cases where there is no cardiac involvement is arsenic permissible, and then only in very small doses, with frequent examination of the urine. In Koplik's cases arsenic has neither cut short nor modified the cause of the disease. In severe forms of chorea with paresis, arsenic is dangerous, as we have no means of telling when neuritis is coming on in addition to the paresis caused by the disease itself. For such cases, isolation in bed, with sedatives and hydrotherapy, gives the best results.—*Med. Rec.*, N.Y., 1908, No. 3.

INSANITY.

UNDER THE CHARGE OF

Sir JOHN BATTY TUKE, M.D., Hon. D.Sc.Dub., F.R.C.P.Ed.,

SUPERINTENDENT OF MAVISBANK ASYLUM;

AND

JAMES MIDDLEMASS, M.D., F.R.C.P.Ed.,

SUPERINTENDENT, SUNDERLAND ASYLUM.

Cortical Motor Localisation.

Drs. Rossi and Roussy report at a meeting of the French alienists and neurologists (*Gaz. d. hôp.*, Paris, 1907, August 20) that they have examined the motor paths in three cases of amyotrophic sclerosis. The results of their investigation are to confirm Campbell's view as to the function of the pre-central (ascending frontal) convolution. In all three cases degeneration could be traced from the affected cells in the cord to the large pyramidal and Beltz cells in the pre-central convolution, and was almost exclusively confined to this. The slight reservation is necessary, as they found degeneration of a few fine radiating fibres in the post-central also, but no cellular affection. The conclusion is that cortical motor function is practically confined to the pre-central convolution.

Cortical Changes in Tabes.

Another paper bearing on Campbell's views of the function of the post-central convolution is that of Gordon Holmes (*Rev. Neurol. and Psychiat.*, Edinburgh, 1908, January). He examined four cases of tabes to test Campbell's statement that in this disease the anterior wall of the post-central convolution shows changes especially in the supra- and infra-stellate layers of large pyramidal cells. The results of his investigation are not confirmatory of Campbell's contention that this part of the cortex is concerned with common sensation and is invariably affected in tabes dorsalis. Apart from the difficulty of supposing that the disease process passes over the nuclei of the posterior columns of the cord and the optic thalamus, which Campbell did not find to show any alteration, there is the defect that Campbell has apparently not compared the tabetic cases with normal sections from exactly the same position. Holmes finds, as Brodmann has already done, that the structure of the cortex of the post-central convolution in the healthy state varies as one passes from the bottom of the sulcus to the convexity of the convolution. In that part of the convolution which faces the sulcus, the cortex is abnormally thin and contains very few large cells. In fact the normal convolution very closely resembles what Campbell has described as typical of tabes. In Holmes's four cases of tabes that cortex did not show any marked departure from the normal, and hence do not support Campbell's view.

Folie à Deux.

An interesting example of this unusual form of mental disease is recorded by Drs. Anglade and Jacquin (*Gaz. hebd. d. sc. méd. de Bordeaux*, 1907, August 11). The example belongs to the class described by Régis as simultaneous *folie à deux*. In this form the individuals are hereditarily predisposed, they live in intimate contact, the attack occurs at the same time in both, they are attacked to the same degree, and it is not influenced by separating the patients. These, in the instance recorded, were sisters, daughters of an insane mother, who, for some years before her death, was influenced by their insane delusions to such an extent that she herself firmly believed them. The disease began very insidiously and progressed very gradually, having existed for about twelve years before it became necessary to send them to an asylum. At the time of admission the elder was 40 years old, the younger 37. They both suffered from delusions of persecution, believed that they were descended from an illustrious family, that they were kept from their rights by malicious persons, and that all the magistrates to whom they appealed were in the plot. They also both imagined that they were engaged, but were kept from seeing their betrothed by persons interested in preventing it. They wrote letters almost daily to their *fiancés*. There was also in both a considerable degree of mental exaltation, which was not a primary symptom, but, as so often happens, developed subsequently to the persecutory ideas. The delusions above mentioned are of the kind usually associated with this form of insanity. There was a certain basis of fact which suggested some of these delusions, particularly with respect to the fortune of which they imagined themselves to be defrauded. It was impossible to say which of the two first exhibited insane delusions. They had had a very hard, unhappy life, and apparently had consoled themselves by talking constantly to each other of how different their life would have been had their grandfather only left his money as he ought to have done. On this basis an insane superstructure was gradually reared, in the building of which both appear to have assisted to an equal degree. It is not usual to meet with this; as a rule, one is the active subject, the other is passive; the one as it were inoculates the other.

Manic-Depressive Insanity.

Dr. Deny of the Salpétrière has written a short paper on this subject in the form of a clinical lecture (*Arch. de Neurol.*, Paris, 1906, July). He gives a history, a criticism, and a definition of the condition. As regards its history, he points out that the recognition of manic-depressive insanity, as a distinct form of mental disease, is primarily based on the description of *folie circulaire* by J. P. Falret in 1851, and of *folie à double forme* by Baillarger in 1854. They both regarded these as examples of one form of insanity, and not as instances of two attacks, one of mania and the other of melancholia, in the same person. These views were not received with much acceptance at first, but gradually came to be regarded as a true picture of clinical facts. Things remained in this state until 1898, when Kraepelin in the sixth edition of his work on psychiatry adopted a new classification. He pointed out that repetition or alternation were not sufficiently important characters to constitute distinct species. He further directed attention to the fact that intermittent, periodic, circular, and alternating insanity show the same evolution the more closely they are studied, and that it is therefore logical to regard them all as fundamentally examples of one disease, which he called by the name of manic-depressive insanity. All the ordinary cases of mania, and all those of melancholia except the senile and pre-senile form, belong to this class. The only other exceptions are the cases of dementia præcox. These views of Kraepelin have been subjected to searching criticism since they were first presented, and many distinguished alienists decline to follow his lead in this matter. Some, however, willingly do so, and Dr. Deny is of their number. He points out the small number of cases of so-called pure mania and melancholia, and thinks that the more carefully these are studied and all the clinical symptoms observed, the more certain it will be that in the end they will be found to correspond to Kraepelin's description. As

Ballet has put it, periodicity is a natural phenomenon in the performance of many functions, and even in normal people the pendulum swings naturally now to the bright, now to the dark side of things.

Dr. Deny ends his lecture by a definition. He considers that manic-depressive insanity is a constitutional affection, essentially hereditary, characterised by the repetition, alternation, juxtaposition, or coexistence of states of elevation and of depression. It has not yet a recognised special etiology or special anatomical lesions, but is a clinical entity, one of the group of constitutional, as dementia præcox is of the accidental, psychoses.

The Treatment of Epilepsy.

Drs. J. and R. Voisin and Rendu give an account of further experiments in the treatment of epilepsy by bromide of potash with and without a chlorine-free diet (*Arch. de Neurol.*, Paris, 1906, September). Their previous investigations were concerned solely with the effect of eliminating chlorine from the diet, whilst bromide continues to be given. So far as the effect on the fits is concerned, the results were satisfactory, but there were decided drawbacks in this procedure. Not the least is the intense and growing dislike of the patients to the insipid diet. There results also impairment of nutrition and a greater tendency to bromide intoxication, which comes on suddenly and intensely. To minimise these defects the authors altered their mode of treatment. For a month the dosage of bromide was increased from 4 to 12 grms. daily. The fits were very markedly diminished, but several undesirable symptoms made their appearance. One patient died three days after the large doses ceased, though death was not due to intoxication by bromide. The seizures were reduced from an average of two hundred and ninety to seventeen. But it was observed that after the cessation of the bromide the fits returned with greater frequency than ever.

They therefore made a further modification of procedure and tried the method of varying the dosage and the diet at different times. They observed that the cessation of bromide during a course of chlorine-free diet produced less effect than when ordinary diet was being taken, and were thus led to observe the results of giving varying doses of bromide alternating with a chlorine-free diet. For ten days the ordinary dose of 4 grms. (60 grs.) was given. During the next ten days this dose was increased to 10 grms., the diet during these twenty days remaining as usual. For the succeeding ten days the diet was free of chlorine, and no bromide was given. This plan was carried out for five periods of thirty days. The results in respect to the seizures were that during the first ten days there were one hundred and eighty-six, during the second twenty-seven, and during the third ninety-six, an average of sixty-two for each thirty days. In previous months, when 4 grms. of bromide had been given daily, with ordinary diet, the seizures had averaged 236·5. The decrease was therefore about 75 per cent. There were no untoward symptoms, but the patients tended to complain of the diet even when it was continued only for ten days. The above procedure is, however, strongly recommended by them as the most satisfactory in the treatment of epilepsy by bromide of potassium. It is to be noted that no reference is made to any other symptoms of epilepsy than the fits. It would have been interesting to have had information of the effects of the treatment on the mental abnormalities which are so common in epilepsy.

The Ductless Glands in General Paralysis.

Schmiergeld has examined in the Salpétrière the thyroid, suprarenals, pituitary, spleen, liver, and pancreas in five cases of general paralysis (*L'Encéphale*, Paris, 1907, November). He finds that in the majority of cases they show decided evidence of disease. In one, however, they were to all appearance healthy. He therefore concludes that these organs do not play any essential part in the genesis of general paralysis. But he remarks that in the case in which they were healthy the disease ran a longer course than usual (more than four years), and suggests that their healthy or diseased condition may have an important bearing on the rapidity with which the nervous disease progresses. The steady emaciation in spite of the large amount of food taken may in part be explained by disease affecting one or other of these important organs. But it is evident that they can play little part in the actual causation of the nervous disease, although it is quite reasonable to suppose that they can play a distinct part in its advance when once it has become established. The facts he records but add another example to the well-known vicious circle which is exhibited in many other diseases.

Have the Forms of General Paresis altered?

Drs. Clarke and Atwood have set themselves to answer this question (*Journ. Nerv. and Ment. Dis.*, N.Y., 1907, September). They made an investigation of the admissions to certain New York asylums, and as a result answer the question in the negative. The cases examined numbered 3000, and the admissions were spread over thirty years. Of late there has been a disposition to the opinion that the cases of general paralysis now seen are less often of the grandiose, expansive type that is regarded as the classical one. The opinion is not confined to this country, but has been expressed by leading specialists on the Continent and in the States. It has been stated that more cases of the demented type are now sent to asylums and less of the grandiose, excited form.

The authors divide their cases into three main forms, and think these cover all cases. These forms are the grandiose, the depressed, and the simple demented. The figures for each year of the thirty are shown in chart form. They show a gradual increase of the simple demented form, but this is considered to be mainly due to the inclusion in it during recent years of cases formerly designated as cerebral syphilis. They also consider that some melancholics are now diagnosed correctly as general paralytics who were formerly overlooked. The yearly variations of the curve chart show nothing distinctive, and no law is deducible. But if five yearly periods be taken, there is a decidedly definite relation between the total admissions, the total paretics and the total grandiose cases. They conclude that the ratio is fairly constant between the cardinal features of the disease, and that the grandiose type is the true disease complex in paresis. The ratios of the three types in the 3000 cases were 70 per cent. grandiose, 20 per cent. demented, and 10 per cent. melancholic.

DERMATOLOGY.

UNDER THE CHARGE OF

W. ALLAN JAMIESON, M.D., F.R.C.P.Ed.,

CONSULTING PHYSICIAN FOR DISEASES OF THE SKIN, EDINBURGH ROYAL INFIRMARY.

The Tuberculoid Sporotrichoses.

Beurmann and Gougerot (*Ann. de dermat. et de syph.*, Paris, 1907, August–November) resume the further consideration of the clinical forms of sporotrichoses. Apparently their incidence is by no means so rare as it seemed when first isolated. They can take on diverse aspects; some simulate syphilis, others tuberculosis, or, again, coccidian suppurations, acute and chronic. Sporotrichosis may imitate more or less perfectly nearly all the hypodermic varieties of tuberculosis; isolated gummata, ulcerated or not; large diffuse abscesses; secondary tuberculo-gummatous lymphangitis. Or it may take the form of dermic manifestations, as tuberculosis verrucosa, nodular tuberculides, the sarkoids of Boeck, acnitis, erythema induratum, etc. Of all these, however, the two types specially tuberculoid are—(1) Disseminate gummata, closed or ulcerated; (2) verrucous areas, with centripetal gummous lymphangitis. The first of these mimics tuberculous subcutaneous gummata. Such are scattered without any arrangement and are open, the orifice being narrow, surrounded by an ovular zone of thin and violaceous skin, covering a palpable subcutaneous depression. The etiology is obscure. The point of inoculation is unobservable, and it is not yet known how infection occurs. The parasite may enter by an excoriation, without noticeable specific lesion. But it is almost certain that the sporotrichum may also penetrate by way of the mucous membranes of the bucco-pharyngeal or gastro-intestinal regions. It is probable that the organism, existing as a saprophyte in nature, carried in vegetable débris, becomes fixed in the pharynx, and thence invades the body by the vessels. Or, the germs may be swallowed in food. The authors have succeeded in reproducing the lesions of *Sporotrichosis disseminata* in a young guinea-pig, fed on milk containing *Sporotrichosis* cultures. The ulcerated tuberculoid sporotrichosis is not readily contagious. Family prevalence has not so far been noticed, yet the ulcerated surfaces secrete a pus rich in parasites. Though the multiplicity and disparity of the lesions might make one hesitate in diagnosis, culture affords the sole certain test. It is extremely simple. An aseptic puncture inoculation on peptonised glyco-gelatine, is grown at an ordinary temperature, without jacketing the tubes. Towards the tenth day, sometimes earlier, the colonies appear. These are at first small, prominent, white, acuminate points, already folded. Later they assume the aspect of cerebral convolutions, grow brown, and finally black. The second variety of verrucose papillary sporotrichosis with tuberculo-gummatous centripetal lymphangitis, is less frequent. The spot of inoculation may be visible, and is probably due to contact with vegetable débris. It is necessary to separate these sporotrichoses with lymphangitis localised and primitive, from the ascending lymphangitis secondary to disseminate gummatous lesions previously described. The lesions are the same, but the mode of invasion is different. The localised lymphangitis consecutive to an initial lesion of the disease remains limited to the lymphatic territory invaded, as to the head in one case related, to the arm in another. In the lymphangitis secondary to disseminate gummata, the point of inoculation is unnoticed, the germ is diffused by the blood stream, the complaint is generalised, and it is incidentally that one of the disseminated gummata infects a lymphatic territory. The treatment by iodide is the same, and is as successful as in the other forms of sporotrichosis. Iodide of potassium is prescribed in doses of 30, 60, or 90 grains daily, while iodine in tincture or solution is applied locally.

The Localisation of Dermatitis Herpetiformis.

Boeck (*Monatsh. f. prakt. Dermat.*, Hamburg, 1907, September 15) drew attention to this as an aid to diagnosis so long ago as 1875, but since this appeared in a Norwegian journal, it escaped general notice. There is not one, he observes, of the more important dermatoses which exhibits such a special, almost constant, continually recurring, fixed and systematic localisation. He has selected mild cases, in which the disease is not widely distributed, to illustrate this point. In such the particular preferential situations are well marked. In order of frequency these are, the elbow and from thence along the outer side of the forearm. Not nearly so often, and less severely implicated, is the skin round the knee. Almost as common as the elbow and more so than the knee, is the skin over the sacrum and above the internatal cleft. So much is this the case, that when the experienced physician has rightly made his diagnosis from the appearances seen near the elbow, and inquires about the sacral region, the patient, recognising his acumen, states that that part of the body has given much trouble throughout the entire course of the disease. From this it may extend upwards along the spine, over the crest of the ilium, or on to the gluteal region. In many cases there is a small isolated portion of integument attacked over the trochanter on both sides. The shoulder blades, the shoulders, and the margin of the axilla are other areas involved. From the deltoid it extends as a broad line on the back of the upper arm, and nearly as often down the back of the thigh. The neck and head are somewhat seldomer affected, and even less so the dorsum of the hands and feet, the palms and soles more rarely still. The front of the body does not suffer so much as the back, and the predilection for definite areas is less strongly pronounced. It is no doubt true that in exceptional instances of dermatitis herpetiformis, the earliest eruption is very limited, and does not evidently follow the above-mentioned distribution. As regards other diagnostic indications, the marked eosinophilia to which Leredde has referred, though of much interest, yet is also encountered in some vesiculo-bullous disorders such as various forms of pemphigus, and in dermatitis vegetans. While we have as yet little light on the cause which sets in action this remarkable disturbance of the vasomotor system, Boeck has noticed that many of his patients suffered from chronic rheumatism, some even foretold an exacerbation when bad weather threatened. As to treatment, he has had the best results, like Duhring, from sulphur ointment, used fairly strong, sometimes usefully alternated with thiol applied as a varnish. Internally he prescribes bromides and anti-rheumatic remedies, cod-liver oil, and rest bodily and mental.

Skin and Ophthalmic Reaction in various Cutaneous Diseases.

Nicolas and Gauthier (*Ann. de dermat. et de syph.*, Paris, 1907, December) have specially investigated this in three groups of skin diseases—(1) In patients affected with typical cutaneous tuberculosis, lupus vulgaris, tuberculosis verrucosa; (2) in skin diseases susceptible of presenting special relations with tuberculosis, lupus erythematosus, prurigo, etc.; (3) in patients taken at random, under hospital treatment for syphilis, varicose ulcers, eczema, etc., in order to determine in a certain degree the value of the method. For the skin reaction a single inoculation was made on the forearm with one drop of a 1 per cent. solution of tuberculin. The reaction attained its maximum usually at the end of twenty-four, rarely of forty-eight hours. The intensity differed from a simple redness of the margins of the scarifications to a voluminous, markedly infiltrated papule with tendency to ulcerate. The duration of the complete evolution of the more pronounced cases might last as long as three weeks, in the less so from four to fifteen days. Of the first group of nine cases all gave a positive reaction. Of the second, seven with four positive and three negative reactions. Of the third, twenty-eight with nineteen negative, two doubtful, and seven positive reactions. One can only grant a relative value to the information furnished by the skin reaction, so long at least as it is not proved that, in persons clinically healthy, positive reactions reveal a latent tuberculosis. On the contrary, negative reactions appear to them to have a greater value, since all the tuberculoses clinically appreciable, yet not in an advanced or grave phase, gave positive reactions. With respect to the ophthalmic reaction, a 1 per cent. specially prepared solution was employed, and of this one drop was allowed to fall into the conjunctival sac close to the internal angle. When the reaction was to be positive it was perceptible between the third and the sixth hour subsequently, though it may be occasionally considerably retarded. Arrived at its height, the reaction exhibits a very variable degree of intensity. It may be no more than a slight redness at the corner of the eye and over the lower palpebral conjunctiva, disappearing in course of a day. In a second class of cases the reaction is pronounced, and readily appreciable. There is general conjunctival injection, some lachrymation and uneasiness without actual pain. These symptoms have almost wholly subsided by the fifth day. But in a further class the reaction is violent; in addition to the other phenomena there was smarting, discomfort, and photophobia. Most of these were gone in ten days, but in one phlyctenular keratitis supervened, and had not completely disappeared twenty-five days after. This was quite unexpected, as the eyes had previously been healthy; but other reported cases show that such sequelæ are not so very rare. Of the patients tested in this way, those clinically tuberculous gave of ten examples nine positive and one doubtful reaction; while of nine not clinically tuberculous, eight gave negative reactions and one positive. The most which can be claimed for these procedures is the establishment of probable tuberculosis, and the cutaneous method is the one to be selected as always painless; the ophthalmic is frequently disagreeable for the patient, and may possibly entail regrettable complications.

DISEASES OF CHILDREN.

UNDER THE CHARGE OF

G. H. MELVILLE DUNLOP, M.D., F.R.C.P.Ed.,

PHYSICIAN, ROYAL HOSPITAL FOR SICK CHILDREN, EDINBURGH.

Alimentary Intoxication in Infants.

Finkelstein in a paper under the above heading (*Jahrb. f. Kinderh.*, Leipzig, 1907, January 7 and March 7) describes a series of cases which he considers characteristic of intestinal intoxication. The two most important symptoms from a diagnostic point of view are certain changes in the character of the breathing and alimentary glycosuria, the latter of which is only present when starch is included in the infant's diet. The glycosuria is usually an early symptom, and frequently makes its appearance after very small quantities of starch or sugar have been included in the diet. It appears in the urine either in the form of lactose or galactose, and not as glucose. The breathing is usually deep and rapid, there being as a rule very short pauses between the respirations. Other symptoms characteristic of the condition are fever, collapse, loss of consciousness, leucocytosis (rarely exceeding 30,000), and loss of weight. In the early stages there is generally only apathy, drowsiness, and loss of response to external stimuli, but this gradually deepens into lethargy, and in severe cases coma may supervene. Sometimes the child lies with the eyes half open, the face having a vacant expression, and the limbs assuming unusual positions. At other times catalepsy may supervene, or we may have general or local convulsions developing, and sometimes sclerema.

The symptoms bear a strong resemblance to diabetic coma, which is, however, a very rare disease in infants. The conditions with which alimentary intoxication is most apt to be associated are acute and chronic gastro-intestinal diseases, infantile atrophy, and the diseases caused by bacterial infection, such as scarlet fever, measles, pneumonia, and septicæmia, etc. Intoxication, however, frequently occurs in infants during disturbances of nutrition. It is generally heralded by some fever, loss of weight, and unhealthy dyspeptic stools. When these symptoms are present, any increase in the amount of food administered is very apt to bring on intoxication. If, on the other hand, food is withheld and only water given, the temperature quickly drops and recovery takes place. During convalescence, food must be very carefully and gradually added. The author believes that of the various elements of milk, sugar and fat are the most potent agents in causing intoxication, the sugar being the more active of the two, while casein and albumin appear to be quite harmless. Nothing is known of the chemistry of the poisons, although the author considers they are not of bacterial origin. He believes that the intoxication is due to the presence of certain intermediary products of metabolism. He summarises his conclusions as follows :—

(1) The intoxication is alimentary in nature. (2) It appears when certain foods are given in greater quantity than can be effectually disposed of. (3) Fat and sugar are chiefly responsible for the symptoms produced. What part the salts take is as yet undetermined. (4) Nothing definite is known regarding the poison producing the intoxication. (5) The condition is the result of malnutrition, the intoxication being merely a transitory indication that such malnutrition is present.

The Varieties of Infantilism.

G. Anton (*München. med. Wchnschr.*, 1907, July 24) describes general, as opposed to local infantilism, as a developmental defect which results in the infantile type of the whole organism being retained with arrest of sexual development. Not only the bodily but the mental attributes of a child continue through adult life and even into old age. The chief characteristics of the condition are slenderness of the bony skeleton and smallness of the viscera resembling those of a child, ill-developed genitals, absence of sexual power, and want of mental development. Both ante- and post-natal diseases of the thyroid gland are important causes of infantilism, and it is believed by many that all forms of cretinism are due to defective thyroid function. Those that hold this opinion believe that infantile syphilis, tuberculosis, alcoholism, and malaria are only contributory causes, and are ineffective in producing the disease if the thyroid gland is healthy. The author's opinion, gathered from a ten years' residence in a goitrous neighbourhood, is that in families where cretinism exists infantilism without goitre is unusually common. Infantilism may be due to defective or abolished function of the testicles, the internal secretion of which before puberty seems to have a considerable influence on growth and development. The suprarenal bodies also seem to exert an important influence on cerebral development, as in many microcephalic and other children with abnormal brains the suprarenal glands have been found to be small and degenerated. Again, there seems to be evidence to show that the thymus gland exercises some influence on development, as it is very common in cases of infantilism to find a persistent thymus gland. Finally, the connection between the pancreas and infantilism only requires to be mentioned. Thus all the glands supplying an internal secretion seem to exercise some important function over growth and development, and the absence of the secretion of each appears to be followed by a special type of infantilism. The author believes that the inhibition of development depends on metabolic abnormalities of various origin. Two causes of infantilism which are not often referred to are injury and primary cerebral disease. Thus, after any accident, especially if accompanied by shock, a child may remain all its life at the stage of development it had reached when the accident occurred. That the brain influences the growth not only of the skeleton, but of all the organs of the body, is frequently noticed by their non-development in cases of infantile cerebral disease.

Œdema in Infants.

In this paper the writer discusses the various causes of œdema in newly born children and in nurslings. He first draws attention to that form of œdema which occurs within a few days of birth in premature or weakly children, and which in the great majority of cases is associated with jaundice. It first appears over the lower portion of the abdomen, and spreads from there to the back of the thighs and legs, and finally to the dorsal aspects of the hands and feet. Although there is well-marked evidence of the presence of œdema in the subcutaneous tissues, the skin at first retains its elasticity, but later there is well-marked pitting on pressure. The colour of the parts affected undergoes striking changes, being at first rosy red from congestion, then assuming a bluish tinge from cyanosis, and ultimately becoming white. The duration of the œdema varies from three to fifteen or twenty days. There is never any albumin present in the urine, which continues to be abundant and clear all through the illness. The author considers that the explanation of these symptoms is to be found in the difficulty which premature and debilitated children find in establishing their respiratory and circulatory functions. In all these cases of œdema which occur within a few days of birth, pulmonary collapse is found to be present. In cases occurring later in life other causes are to be searched for. In some of them a septic origin can be traced, the source of infection often occurring through the umbilicus. In these cases the kidneys are affected, albumin is present, and the œdema, which is whiter and softer than the previous variety, persists. Syphilis is accountable for a certain proportion of the cases of œdema met with, and is usually associated with enlargement of the liver and spleen. Certain conditions of the pulmonary system, especially spasmodic cough, frequently cause œdema of the face by bringing about venous stasis. Other cases, again, especially when the œdema is localised in the upper limbs, are caused by compression of the ascending vena cava and the large venous trunks by enlarged mesenteric glands. At other times œdema occurs in the course of enteritis or other serious digestive disturbances, and in these cases the anasarca is general. Sometimes these cases are associated with albumin in the urine, while in others it is absent, and in these latter there is retention of the chlorides.—*Rev. mens. d. mal. de l'Enf.*, Paris, 1907, September.

REPORTS OF THE MEDICAL SOCIETIES.

Edinburgh Medico-Chirurgical Society.—*March* 4, 1908.—Dr. James Ritchie, President, in the chair.—Mr. Alexis Thomson showed a boy, æt. 16, who is unable to completely extend the elbow as a result of a slight displacement forward of the epiphysis of the olecranon (with skiagram).—Mr. George Chiene showed two patients after operation for perforated gastric ulcer, in which the abdominal wall was completely closed at the operation. Primary union resulted in both cases.—Dr. F. M. Graham showed a photograph and skiagrams of a case of absence of both forearms.—The following papers, which will appear in the Journal, were read, namely—(1) "On Diverticula of the Ileum resulting from Tuberculosis and Accessory Pancreas," by Mr. Alexis Thomson. (2) "On the Provision of Sanatoria for the Treatment of Curative Cases of Phthesis among the Poorer Classes," by A. Walker. (3) "Observations on the Use of Inoculations of Bacterial Suspensions," by Mr. Peel Ritchie.

Edinburgh Obstetrical Society.—*March* 11, 1908.—Professor Stephenson, President, in the chair.—Sir Halliday Croom showed a specimen of a fibroid tumour of the ovary; a fibroid tumour of the uterus, removed by hysterectomy from a girl æt. 19; a fœtus with hydrocephalus, delivered head last by catheterisation of the spinal canal.—Dr. James Lochhead gave a communication "On Transmission of Nitrogenous Compounds from Mother to Fœtus."—Dr. W. E. Fothergill, Manchester, gave a communication "On the Modern Operative Treatment of Downward and Backward Displacements of the Pelvic Viscera." From anatomical considerations it is generally assumed that the urino-genital organs are partly suspended by the so-called ligaments of the uterus, and partly supported from below by the pelvic floor. But the perineum and the pelvic diaphragm are often seriously impaired by injury or loss of tone without any consequent change in the position of the pelvic viscera, which shows that support from below is not essential. Again, during abdominal operations the ligaments of the uterus are seen to lie loose and slack upon the subjacent structures, and to have no supporting action whatever. The operation of vaginal hysterectomy affords confirmation of these observations, and reveals to the clinician the fact that the uterus is really supported by the sheaths of its blood vessels which attach it firmly to the sides of the pelvic diaphragm. In the same way the vagina and the bladder are held in position by the sheaths of their blood vessels, the rectum having an independent attachment to the back of the pelvis. The lengthening and laxity of the sheaths of the blood vessels is the one constant and essential factor in the causation of prolapse of the pelvic viscera. The vessels and their sheaths, together with the uretus, nerves, and lymphatics, form masses of tissue which extend between the sides of the pelvis and the lateral aspects of the uterus, bladder, and vagina, and which hold these structures in position. The rectum is independently attached to the back of the pelvis, and lies loose in a channel between the vessels of the right and left sides. It is free from the urino-genital organs, and does not descend with them in prolapse unless the anterior rectal wall is pathologically adherent to the posterior vaginal wall. Reference was made to the operative treatment of the various displacements. Anterior colporraphy, modified to admit of union in the middle line in front of the cervix of the parametric and paravaginal connective tissue, posterior colporraphy, and ventro-fixation were discussed in relation to the treatment of prolapse of the uterus. The choice of cases and choice of methods for operative treatment of backward displacement of the uterus were reviewed, and Alexander's operation, ventro-fixation, and intraperitoneal shortening of the round ligaments were described.—Dr. FREELAND BARBOUR read a paper, accompanied by numerous illustrations, "On the Frozen Sections by Bumm and Blumreich and by Langemeister."

GLASGOW MEDICO-CHIRURICAL SOCIETY. — *March* 6, 1908.—Dr. WALKER DOWNIE in the chair.—Dr. C. O. HAWTHORNE, London, read a paper on "The Occurrence of Cerebral and Ocular Complications in Cases of Anæmia, and the probable Relationship of these to Thrombosis." He believed thrombosis in the circulatory system was due more to diminution of blood flow than to the state of the blood itself. He referred to cases of simple anæmias where thrombosis took place in the veins of the lower limb, and in which the thrombus was completely removed by absorption. He recorded cases with symptoms of headache, pain in the neck, optic neuritis, fever, paralysis, stupor, and coma, followed by death, in which at the autopsy no meningitis was found, but a thrombosis of one or more of the cerebral venous channels. In other cases, with similar symptoms, there had been a thrombosis of the jugular or femoral vein which partly confirmed the idea of an intracranial thrombosis, and some of these had recovered. He believed this was due to absorption of the clot. From these more severe types he had a continuous series down to cases with double neuritis alone or associated with ocular palsy. In the case of a girl, æt. 17, with chlorosis, these two symptoms were present, and the patient recovered completely under treatment in three months. He considered that the clot must be assumed to act after the manner of a tumour, and so explain the neuritis. In purulent middle-ear disease, optic neuritis, without cranial complications, he believed was due to a similar thrombosis and not to a meningitis, and post-mortems had confirmed this view. Alterations in the visual field and embolism of the retinal artery were also passed under review, and explained on a similar ground.

March 13, 1908.—Dr. WALKER DOWNIE, President, in the chair.—Dr. W. B. I. POLLOCK showed a patient with telangiectasis of the retinal capillaries and veins. There were several patches somewhat resembling hæmorrhages in their appearance, but this explanation was negatived by the fact that the patient had been under observation for over a year. There was marked tortuosity of some of the vessels.—Dr. Kerr Love read notes of a case of aural tuberculosis, in which after cure of the disease in the temporal bone and in the glands of the neck, death took place from a tuberculous tumour in the pons, associated with meningitis. The extension was believed to be by a blood infection, as there was no evidence of continuity of the disease along the nerve sheaths or otherwise, and the later lesions were on the opposite side of the brain from the aural condition.—Dr. Walker Downie showed stereo-photographs of a large external fibro-cellular tumour of the nose. The tumour extended from the nose down to about the lower edge of the chin.—Dr. John Rowan showed a number of photographs, prepared by the new (Lumière) colour process, illustrative of certain external diseases of the eye. He considered the method of great service, the chief difficulty at present being the long exposure required.—Dr. Carl H. Browning related certain experiments in "The Treatment of Trypanosome Diseases by means of Drugs." Atoxyl had effected a cure in 80 per cent, while a derivative "acetyl" had reached the same result in 93 per cent.

Forfarshire Medical Association.—*March* 5, 1908.—Professor Kynoch in the chair.—Dr. Kerr showed a man, æt. 36, after fracture of the base of the skull and probably fissured fracture of the left parietal bone, who several weeks after apparent recovery had periodic attacks of aphasia and paresis of the right arm and leg, associated with paralysis of the external rectus muscle of the right eye, and considerable disturbance of mental functions.—Dr. Mitchell showed a man after interscapulo-thoracic amputation of the arm for sarcoma of the humerus.—Dr. G. Miller showed a man with herpes, involving all the superficial branches of the cervical plexus on the right side.—Professor Kynoch showed various specimens, and read notes "On a Case of Pregnancy complicated with Cancer of the Rectum." He gave an analysis of thirty reported cases; in only one where the cancer was removed had pregnancy gone on to full time. If the death of the mother was inevitable, the only method of treatment was Cæsarean section, or induction of labour to save the child. If the growth was small, it should be removed without delay, but it was best to first induce labour, as then the risk of septic infection of the uterus was lessened. The case under his observation occurred in a primipara, æt. 21. She was first seen in the sixth month, when a large colloid cancer, involving the rectum up to the sphincter and narrowing the vaginal canal, was discovered. Removal was impossible, she refused to have Cæsarean section, and the only alternative was to induce labour. This was done at the seventh month, but delivery was very difficult, forceps had to be used, and the vaginal septum gave way in to the rectum. The child was dead, and the mother only survived for thirteen days.—Drs. Don and Buist mentioned a case where a small cancerous tumour had been removed from the rectum of a multipara, æt. 34. The operation, however, was followed by abortion at the sixth month.—Dr. Don read notes on two cases which he considered to be Henoch's purpura associated with angio-neurotic œdema; and Mr. Greig also read notes of a similar case of Henoch's purpura.

FORMAMINT LOZENGES.

(A. Wulfling & Co., 83 Upper Thames Street, London.)

FORMAMINT is a chemical combination of formic aldehyde and milk sugar, in which the former is deprived of its irritating effect on the mucous membrane of the mouth and throat. Formamint has no such internal effects as pure formic aldehyde. The action of the saliva sets free nascent formic aldehyde, and this has a marked and prompt bactericidal action. With the samples submitted to us the makers have forwarded a number of favourable opinions culled from the medical press, and it is a pleasure to us to endorse these. We have employed formamint lozenges somewhat extensively during the past year in the treatment of follicular tonsillitis and other buccal and pharyngeal infections, and are satisfied that it is extremely useful. The appearance of the throat, as a rule, speedily improves under its use, and at the same time the discomfort of the patient is relieved. It is a useful addition to the physician's armamentarium.

MESSRS. BURROUGHS, WELLCOME, & CO.'S PREPARATIONS.

"*Tabloid*" *Quinine Compound.*—This is composed of the alkaloids of cinchona, antifebrin, monobromate of camphor, ipecacuanha, and cascara sagrada. Its antiseptic, antipyretic, expectorant, and laxative properties indicate its sphere of usefulness, namely, at the onset of a catarrh to assist in the cutting short of the febrile process.

"*Tabloid*" *Gingamint.*—This is a variant in the well-known soda mint tabloids of the same firm. It contains sodium and ammonium and ammonium bicarbonate, saccharine, gingerine, and oil of peppermint. Its uses as an antacid and stomachic in all forms of dyspepsia are sufficiently obvious; it is in every respect a valuable and effective preparation.

SEPTOFORMA.

(Union Limited, 1 N. St. David Street, Edinburgh.)

SEPTOFORMA is a new disinfectant and antiseptic, of German origin. The sample sent us consists of a yellowish, slightly oily liquid, which froths on shaking and yields a soapy solution in water, having a definite odour of formaldehyde. When mixed with hot water the smell of formalin was decidedly stronger than would appear from the maker's statement. Septoforma is an alcoholic soap containing condensation products of formaldehyde, beta-naphthol, and other bodies of the phenol group. It is employed as an antiseptic as a 1 per cent. to 3 per cent. solution, which has a decidedly detergent action, but is not irritating to the skin, and, being alkaline, does not rust instruments. Its germicidal power is shown by the fact that a 3 per cent. solution destroys streptococci in two minutes, tubercle bacilli in fifteen minutes, and anthrax in six hours. Its applications are those of lysol, and while one of the claims made for it is that it is free from the objectionable odour of that substance, we should say that this must be entirely a matter of personal opinion, because many persons are sensitive to formaldehyde, which is very distinctly evolved when septoforma is mixed with warm water. Septoforma is also supplied in combination with a solid soap base, which should be useful in obstetric work, as well as for parasitic skin diseases.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL.

The late Dr. Underhill. THE records of the Royal College of Physicians fail to show that, till Dr. Charles E. Underhill passed away on the 24th April, any of its Presidents died during tenure of that office. Dr. Underhill was elected to the Chair, not merely by the unanimous vote of the Fellows, but at their universally expressed wish, as they desired to have as their head a man universally respected, and recognised as an outstanding figure in the profession.

Dr. Charles Underhill came of a family of doctors, his grandfather and father having conducted an extensive practice in Tipton, a mining village built on soil honeycombed by old coal workings, and so liable to subsidences that it was always doubtful whether a door would work on its hinges from one day to another. The father was a man of great energy, ruling his somewhat rough patients, who might be reckoned in hundreds, with that firmness and determination which gained their respect. His practice, however, was not by any means confined to the miners; it extended to all classes, and the "old doctor's" influence was recognised by all sections of the county. His popularity was great, not merely in his professional capacity, but as Justice of the Peace, and as a sound, fearless, and capable man of business. The practice was conducted by the aid of numerous assistants; the gigs were always at the door, and the consulting rooms were always full.

In the atmosphere of medicine Charles Underhill was brought up, and to this may to a great extent be ascribed that intuitive insight into disease which constituted his special characteristic as a physician. He was educated at Bromsgrove and subsequently went to Shrewsbury, spending most of his holidays in taking part in the general work of the surgery. He then proceeded to Cambridge, Caius being his College. There he gained the reputation of a steady worker, and took a good degree. He was known on the river, and was reserve man for the University boat. As all his bent was for medicine, he came to Edinburgh, where again he took a high position amongst his fellows, and "Uncle" Charles was the centre of a coterie consisting of the best men. He was elected President of the Royal Medical Society—another recognition of his worth.

Graduating in 1870, Dr. Underhill soon became associated with Matthews Duncan, and, when that great gynæcological authority was attracted to London, Underhill soon acquired a large and lucrative practice. Possessing all the inherent attributes of a physician, being specially imbued by veritable kindliness of heart, and being specially *not* imbued by a commercial spirit, he soon became the trusted medical adviser of a large clientèle, many of whom were drawn from the highest rank. In fact he was a successful man, and that not merely from a professional point of view, for by his walk and conversation he was recognised by a large circle of friends as a genuine man. The present writer, who knew him from his youth upwards, can say that he never knew him make a mistake in ethics or in manners. One might disagree with him on certain points, but no one could gainsay the purity of thought which prompted his objection.

The Education Bill and Scottish Universities.

It would be well for all graduates of the Scottish Universities were they to study the thirteenth and fourteenth clauses of the Education Bill now before Parliament, which threatens the autonomy of those great institutions, and proposes to relegate their administration to the Education Department of the Scottish Office. These clauses are most insidious and ingenious. It has been recognised for some time by those who have gained an insight into the inner workings of the Department, that it desired to sweep all educational matters into its net, and that its eyes have been set on the Universities. The provisions of the Bill would serve this purpose. Shortly stated, the provisions are as follows: (1) The Grants to the University made by the Acts of 1889 and 1892 remain untouched. All other Educational Grants for the purposes of general education under the Custom and Excise Act of 1890, the Education and Local Taxation (Scotland) Act, 1892, and any sums voted by Parliament for educational purposes in the future, are to be pooled, and under the title of the Education (Scottish) Fund are to be administered by the Department. The applications of the Fund for General Education are stated in Clause 14. The only part of the clause which demands attention for the present purpose is subsection (*b*) of section I., which provides for payments to the Universities. All the other sections provide that the moneys, for whatever purpose, are to be applied or distributed by the Department. In the case of the Universities there is a subtle distinction. In their case, all sums in respect of yearly maintenance expenditure are to be made payable as the Secretary for Scotland may determine, after consideration of the results of such investigations as he may from time to time direct to be made. Here is a distinction without a difference, for how would it work! The Secretary, either on his own initiative or that of an outside body, may, when an application is made for a money grant by a University, order an investigation to be made. Naturally he would turn to the experts connected with his office, and a committee would be appointed virtually by the Department, which would equally naturally exercise an overpowering influence over the internal affairs of the Universities. It would lay down conditions under which grants should be made, and in fact dominate the position. It is believed that this subject will be brought before the General Council by the University of Edinburgh at the meeting to be held on May 6th, when it is to be hoped that all graduates desirous of maintaining the independence of their Alma Mater will attend.

The Origin of so-called Branchial Fistulæ.

It has long been assumed that the fistulæ which open on the skin at or near the anterior border of the sterno-mastoid owe their origin to the persistence of one or other of the branchial clefts. That this hypothesis, without any evidence being produced in support of it, has been so generally accepted, is probably due to the absence of a better explanation, and it may also be due in part to the knowledge that the sceptic in matters relating to medical teaching and practice is rarely a *persona grata* with his professional brethren. Quite recently it occurred to Dr. Weglowski of Moscow[1] to compare the structure of the wall of the so-called branchial fistulæ with that of the fistulæ met with in the middle line of the neck, and he found the resemblance to be of so intimate a character that he was driven to the conclusion that their method of origin was probably the same. He also revised the existing knowledge of the branchial clefts themselves, and, arguing from the fact that they are invested on both aspects by stratified squamous epithelium, and that they do not extend to a level below that of the hyoid bone, he appears to be justified in forming the opinion that the branchial clefts have nothing to do with the occurrence of lateral fistulæ in the neck.

In addition to the mesial depression in the anterior wall of the primitive mouth, which grows downwards as the thyreoglossal duct, is lined with ciliated epithelium, and at its lower end forms the middle lobe of the thyroid, there appear on either side of the primitive gullet two depressions which in time grow downwards as two canals lined with ciliated columnar epithelium, and from which are developed the thymus and the lateral lobe of the thyroid. He maintains that the lateral fistulæ of the neck originate from the remains of the thymus and thyroid canals by the same process as the mesial fistulæ take origin from the thyreoglossal duct. Persistent portions of the thymus canal are found, according to his observations, anywhere between the pharynx and sternum in a proportion of something like 14 per cent., while he has only met with remains of the thyroid canal in two out of 150 observations.

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[1] *Centralbl. f. Chir.*, Leipzig, 1908, April 4.

It would appear that the lateral fistulæ take origin much more frequently from the long thymus canal than from the short thyroid one, and that they nearly always follow the recognised course of the thymus canal. The latter begins in the lateral wall of the pharynx, between its ridges and below the depression for the tonsil, passes out above the hypoglossal nerve, and runs downwards and outwards between the carotids and along the inner border of the sterno-mastoid muscle until it reaches the sternum. Fistulæ derived from the thyroid canal are short and open to one side of the entrance to the larynx. The usual sequence is that the persistent portion of the canal becomes dilated into a cyst, which, with the help of superadded inflammation, bursts externally and forms a fistula. An incomplete fistula, low down near the sternum, is the one most frequently met with, because this part of the canal is the one which most often persists.

It is not necessary for us to emphasise the interest and importance of Weglowski's observations; we approve, however, of his suggestion that the term *branchial* should be given up in designating the fistulæ which open in the vicinity of the sterno-mastoid muscle, and that these should be called *lateral fistulæ* of the neck.

Memorial to Professor Annandale.

The proposal to establish a Memorial to perpetuate the memory of a man of the late Professor Annandale's reputation and popularity will doubtless meet with wide acceptance. It is proposed that a fund should be raised for the purpose of awarding a Gold Medal to the best student of Clinical Surgery in the Final Examination, to be known as the Annandale Gold Medal in Clinical Surgery. It is also proposed that a Bust of the late Professor should be placed in the clinical theatre of the Royal Infirmary, so long associated with his teaching. And, in the third place, it has been suggested that, as the late Professor identified himself so closely with the athletic work of the University, any surplus should be devoted to some memorial in connection with the Athletic Club.

We anticipate that the triple form of the Memorial will appeal to a wide circle, and we have been requested to intimate that those who desire to subscribe should communicate with Mr. H. M. D. Watson, C.A., 13 Rutland Square, Edinburgh, who has consented to act as Secretary and Treasurer to the Committee in charge of the Memorial.

AMONGST the distinguished men, representing almost every branch of literature and science, who received the honorary degree of Doctor of Laws of the University of Edinburgh at the recent Graduation Ceremonial, there were two whom all medical graduates of the University will acknowledge to have fully deserved the highest honour which their Alma Mater could confer. Dr. Affleck has passed his life in our midst, a life of strenuous endeavour, crowned by unqualified success as a teacher, writer, and scientific physician. These are not, however, his only claims to distinction or to the congratulations we beg to offer him. Dr. Affleck has taken a prominent and unselfish part in all questions affecting the profession in his native city, while his kindness of heart and uniform courtesy has gained for him the affections of a wide circle of friends.

It is not often that a member of our profession attains the highest office in municipal government, more especially in one of the largest cities of the Empire. This in itself might justly be regarded as a reason for the University bestowing upon a former graduate such honour as lay in her power. But Dr. Richard Caton, although the Right Worshipful the Lord Mayor of Liverpool, has earned the gratitude of his Alma Mater in a manner, it may be less conspicuous, but yet none the less useful to his fellow-men and honourable to himself. His writings upon diseases of the circulatory system and the methods of treatment of these conditions which he has introduced, his archæological achievements, and, lastly, his untiring efforts in the cause of medical education, and more especially his services in connection with the University of Liverpool, constitute a record of work of which he and his old University may well be proud.

A MEETING of the Medico-Legal Society is to be held in Edinburgh on Friday, 5th June. The members will meet in the Department of Forensic Medicine, New University Buildings, at 10.30 A.M., when, amongst the subjects to be discussed, are the following:—English and Scottish procedure in the preliminary investigation of sudden or violent deaths; certain imperfections in the law in connection with insanity; wounds of the throat in relation to accident, suicide, or murder. On the following day the members will visit Glasgow by invitation of Professor Glaister, and inspect the new Forensic Medicine and Public Health Department of Glasgow University. This is the first meeting of the society to be held out of London, and any members of the medical or legal professions interested are cordially invited to attend.

Post-Graduate Course. THE Autumn Post-Graduate Course will extend this year from 31st August to 26th September. The general arrangements will be very similar to those of previous years.

A new feature will be a special Surgical Course, which will include classes upon Operative Surgery, Surgical Anatomy, X-rays applied to Surgery, Surgical Pathology, and Pathological Methods. Attendance upon these classes will be confined to those who enter for the Surgical Course, and will be limited to twenty-five. So far as possible the same department of Regional Surgery will be treated of simultaneously in the various classes, while the subject-matter of the daily clinics and ward visits will be, whenever possible, arranged to correspond. Six hours' surgical instruction will be obtainable each day.

The general course will include Medical and Surgical Clinics, Ward Visits and Operations, Diseases of the Eye, Dermatology, Neurology, Fevers, Diseases of Children, Applied Anatomy, Lectures upon Dietetics, Demonstrations on Morbid Anatomy, etc. Each day throughout the course, at five o'clock, a lecture open to all graduates attending will be delivered by one of the leading members of the School upon some subject of general medical or surgical interest.

The Committee of Management of the University Union have kindly arranged to open the Union during September for the benefit of graduates.

During the last fortnight of August a series of Post-Graduate classes will be held on methods of diagnosis.

A syllabus containing all information regarding the September Course and various classes may be obtained on application to the Secretary, The Faculty Office, University New Buildings, Edinburgh.

ORIGINAL COMMUNICATIONS.

ACUTE RHEUMATISM: THE EVIDENCE IN SUPPORT OF ITS BACTERIAL ORIGIN.[1]

By James M. Beattie, M.A., M.D. (Edin.), *Professor of Pathology and Bacteriology, University of Sheffield.*

Garrod in 1890 wrote of rheumatism, "We still remain almost entirely ignorant of the nature of the morbid process concerned in its production." Ten years later the same words might have been penned with equal truth. It is true, medical literature abounds with vague theories. The physician, the chemist, and the physiologist have all had their innings, and with equally unsatisfactory results. Now the bacteriologist and the pathologist are at the wickets, and I hope to show you to-night that we are, to say the least, keeping up our end.

Fascinating though the subject is, time will not permit me to deal with the older theories, and I therefore confine myself to the bacterial hypothesis, and will give you as briefly as I can the evidence in its favour.

The resemblance between acute rheumatism and other bacterial diseases has been long recognised by clinicians, and every physician of experience must be able to recall cases which he thought were acute rheumatism, but which turned out to be pyæmia or septicæmia. Newsholme has shown that the disease occurs in epidemics of irregular periodicity, comparatively independent of meteorological influences, occurring at intervals of three, four, or six years, and varying much in intensity, a severe epidemic being often followed by two or three mild outbreaks.

This epidemic character, which can be explained only, or at any rate most satisfactorily, on the view that the disease is caused by some infective agent, and that probably a parasitic one, was emphasised by Dr. Cheadle, who at the British Medical Association meeting in 1895 said, "The occasional epidemic prevalence, the variability of type, the incidence upon the young, the occurrence of tonsillitis, of endocarditis, of pleurisy, of pneumonia, of erythematous eruptions; the rapid anæmia, the tendency to capillary hæmorrhage and albuminuria; the implication of the joints, the relapses, the occasional supervention of hyperpyrexia, the nervous disturbance, the specific power of salicylic acid, are all suggestive of an infectious disease."

It is natural, therefore, that a search should have been made for a bacterial cause. Many observers, from 1875 onwards, described micro-organisms which they had found in the cardiac valves in cases of acute rheumatism. To these observations I can refer only very briefly. In 1887, Popoff published in Russian a report of a case of acute rheumatism from the blood of which he had obtained cultures of a micrococcus. With this organism he produced in rabbits arthritis, pericarditis, and endocarditis. The details of the experiments I have not been able to obtain. It is interesting to note that the same year, Dr. A. Mantle, at a meeting of the British Medical Association, expressed the view that rheumatism was a bacterial disease; and found no supporters for this advanced hypothesis. Nothing further seems to have been done till 1891, when Achalme and shortly afterwards Thiroloix and Bettencourt described an anthrax-like bacillus which they had isolated. With this organism Achalme was not able to produce any of the lesions of acute rheumatism in animals, but in 1896 Thiroloix claimed to have produced with it the entire picture of rheumatic fever. Confirmation of this work has not, so far as I have been able to find, been obtained, though several workers started their investigations with the object of supporting Thiroloix, whose work had favourably impressed them.

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[1] A paper read at the Medico-Chirurgical Society of Sheffield, March 19, 1908.

In 1898, Triboulet, and, somewhat later, Triboulet and Apert, isolated a diplococcus from eleven cases of rheumatic fever, but with it they failed to produce arthritis. More complete work was done in 1899 by Wasserman, who, experimenting with a diplococcus which he had isolated from a case of chorea, produced polyarthritis and what he regarded as rheumatic fever in a series of eighty rabbits. He considered this diplococcus was specific.

In this country Wasserman's work has been extended and amply confirmed by Poynton and Paine, Walker and Beaton, and Vernon Shaw, and in Germany by Fritz Meyer and others. Briefly stated, these workers with a diplococcus which had been isolated from a series of cases of acute rheumatism produced in rabbits and in monkeys polyarthritis, valvulitis, pericarditis, pleurisy, pneumonia, chorea, and rheumatic nodules, in fact the whole clinical picture of rheumatic fever.

My own observations have corresponded in most details with the work of these observers.

I have isolated from several cases of acute rheumatism an organism which corresponds in all its characters with that described by Poynton and Paine. I regard it as a streptococcus, and morphologically and culturally it cannot in most of its features be differentiated from streptococci which are found normally in the mouth and in the intestine. It probably, however, possesses certain peculiar characters, which neither the culture tube, even though you add to it all the sugars which the chemist knows, nor the microscope can detect. Unlike the majority of the streptococci, it is a very resistant organism, and lives, as it seems to me, almost indefinitely in the culture tube, and probably in the tissues of the individual too. A culture which I made in July 1905 on blood agar is still alive in its original tube.

My experimental work has been carried out with three strains of the organism, which I isolated from three typical cases of acute rheumatism. Only one of these need be mentioned.

Case.—The patient was a robust man, who when admitted to hospital complained of pains in the ankles and knees. There was a definite history of an attack of rheumatic fever five years previously. On admission there was swelling in both knees. Five days later he became delirious, and he died the following day. Ten hours after death an autopsy was made and pure cultures of a streptococcus were obtained from small congested areas in the synovial membrane of both knee-joints. Tubes were also inoculated from the fluid in the joints, from the brain, the spleen, and the heart blood, but all these remained sterile.

The other cases presented similar features, and the organism here too was obtained from the congested synovial membranes only.

Cultures of the organism were injected intravenously, subcutaneously, intra-peritoneally, and into the knee-joints of a series of twenty-eight rabbits—two subcutaneously, two into the knee-joint, one intra-peritoneally, and twenty-three intravenously. No result was obtained from the subcutaneous injections. Where the organism was injected into the knee, there was, as one would expect, the following day considerable swelling and tenderness of the joint. It is of interest, however, that pus did not form in the joint. At the post-mortem in both cases there was some destruction of the cartilage and a slight amount of lipping of the bones, but no ankylosis; and in one of the animals there was a small vegetation on the mitral valve. One rabbit, which had had an inoculation into the right knee-joint, and which had apparently recovered, was inoculated in the peritoneal cavity four months after the primary injection. The following day the right knee was swollen and painful, but in four days the acute symptoms had passed off. Three days later it was again inoculated in the peritoneal cavity and a recrudescence of the knee condition took place. This was again allowed to subside, and a week later another intra-peritoneal injection was given, with again a reappearance of the acute symptoms in the knee. At the post-mortem, done four days after this last attack, the joint contained a very small quantity of viscid exudation, in which a few polymorpho-nuclear leucocytes and a large number of the mononucleated cells characteristic of inflammatory exudations, but no organisms were found.

These results, interesting though they were, did not give any definite facts on which the proof of the causal relation of the organism to acute rheumatism could be established, and therefore the experiments were not repeated or extended, but attention was mainly directed to the intravenous injections.

Of the twenty-three rabbits inoculated in this way, six received very small doses and developed no symptoms, and at the autopsy showed no pathological lesions. In the seventeen remaining rabbits the following is a summary of the main lesions:—

Nine showed arthritis and endocarditis; three showed arthritis alone; one showed arthritis and acute interstitial nephritis; one showed endocarditis alone; one developed chorea, and a definite polymorpho-nuclear leucocyte exudation was found in the membranes of the spinal cord; two showed no symptons during life, but at the autopsy in one there was myocarditis and an acute interstitial nephritis, and in the other an exactly similar acute interstitial nephritis.

Thus, the percentage of inoculated animals, which developed symptoms and pathological lesions simulating those seen in the human subject in cases of acute rheumatism, is very high. Taking the whole of the animals which were inoculated intravenously, almost 60 per cent. developed arthritis, and over 40 per cent. endocarditis, whereas if one excludes the animals which did not receive a sufficient dose, the percentage of arthritis reaches 76 and of endocarditis almost 60, certainly a very striking record for experimental work. But these results are even more important when they are taken along with other facts. The arthritis was in the great majority of cases in the knee-joints, was always non-purulent, and in some cases the alternation of attack in different joints was well marked. The acute interstitial nephritis seen in three of the cases was exactly simulated in the kidneys of a patient from whom I isolated what I believe to be a causal streptococcus. I cannot give you to-night the details of all the experiments, but some of the more important points of four of them should be mentioned. Two of these are typical, one showed arthritis and interstitial nephritis, and the other I have not so far been able to reproduce, but it is to me the most important of the whole series.

1. *The typical cases.*—(*a*) Four days after an intravenous injection there was definite arthritis in the left knee. From this the animal recovered and remained apparently well for three days. On the fourth day it was found dead, and at the autopsy there was a very definite recent mitral endocarditis, and an infarction in the spleen. The streptococcus was recovered in pure culture from the heart blood and some of the joints, as well as from the spinal cord. In other words, the rabbit died from rheumatic septicæmia.

(*b*) On the 24th July a rabbit was injected intravenously with the organism isolated from a second case. On the 27th July there was slight lameness in one of the hind limbs. On the 28th July I noted "suspicious systolic murmur over heart—not able to localise." 29th July the murmur was very distinct. The left ankle-joint was swollen. On 5th August the rabbit was killed. There was endocarditis, with large vegetations, of the aortic cusps; a recent infarction in the right kidney, some viscid non-purulent fluid in the right knee-joint and in the left ankle-joint. The synovial membrane in both was thickened and somewhat gelatinous in appearance. The streptococcus was isolated in pure culture from the vegetations and from the joint exudations.

2. A rabbit was inoculated intravenously on the 26th June with a culture which had been grown outside the body for six months. A very large dose (five agar tubes) was given. On 29th June there was lameness in the right hind limb. On 1st July there was very definite

improvement in the condition. On 2nd July there was lameness in the left hind limb. This did not improve, and a few days later there was a recrudescence in the right limb, which got gradually worse, and on 18th July the animal was killed.

At the post-mortem there was congestion of the synovial membrane in both hip-joints. All the other joints were healthy. There was no endocarditis. In the kidney there were a number of small wedge-shaped areas, which on microscopic examination proved to be areas of acute interstitial nephritis. A similar condition was got in other two animals.

3. *The atypical case.*—Four days after an intravenous injection into a young rabbit, the animal was very ill, and could not be got to move about. It was impossible to decide as to the presence or absence of arthritis. On the fifth day the animal died. At the autopsy the principal change was a marked congestion of the synovial membrane of both knee-joints, which contained a very small quantity of clear fluid. There was no endocarditis. Culture tubes were inoculated from the heart blood, from the fluid in the joints, and from small pieces of the synovial membrane. The two former gave no growth, but from the synovial membranes a pure centre of the streptococcus was obtained. Microscopical examination of the synovial membranes showed irregular scattered areas of polymorpho-nuclear leucocytes, and in these areas only were the organisms found.

This experiment is an exact reproduction of what was seen in the most typical case I have investigated in the human subject, and it opens up a most interesting field of investigation, for my work had forced me to the conclusion that rheumatism was one of those bacterial diseases in which in the majority of cases, at any rate in adults, the bacteria are localised to certain areas; that at these local sites they multiply, and from them distribute their toxins; that most of the clinical manifestations of the disease are due to the toxins and not directly to the bacteria themselves. This atypical experiment confirmed me in that opinion, and it also seems to me to dispose of much of the opposition to the bacterial hypothesis, and especially to the view that a causal relationship of the organism isolated by Wasserman and others to acute rheumatism has not yet been established. For much of this opposition is based on failure to obtain the organism from the blood or from the joint exudations.

Thus Philipp made cultivations from the blood in twenty-four cases of acute articular rheumatism, and, failing to find the organism, declared that it had not yet been discovered. Cole of the Johns Hopkins Hospital and Bulloch found their opposition partly, at any rate, on the same grounds. They have not been able to find the streptococcus, and therefore declare that the organism we have isolated has no relation to the disease. The results of my culture experiments, and also of microscopic examination, indicate that the organism may be missed altogether in cases where the arthritis is the principal manifestation of the disease, unless several different areas of the synovial membrane are examined. My experience is that areas of synovial membrane may give negative results, while other areas give positive ones. The explanation of this I shall show with the lantern. In the human subject, my experience has not been that of Poynton, for I have not in any of my cases found the organism in the blood or in the joint exudates.

It would be quite impossible to-night to deal at all fully with the opposition which has been brought forward on other grounds, and it is fortunately hardly necessary, for much of it is founded on a total misapprehension or misinterpretation of the views of the followers of Wasserman. Thus several observers have striven to show that the organism we have isolated is a streptococcus. It certainly has been called a diplococcus and a micrococcus, but even a superficial examination of the work done must convince anyone that it might with equal truth have been called a streptococcus. We have all described it as a coccus occurring in pairs and in short chains. Morphologically and in most of its cultural characters it is indistinguishable from various species of streptococci of the mouth and intestine, and the position we take would not be in the least weakened if the organism were proved to be a normal inhabitant of the alimentary tract.

When, however, it is said that this streptococcus is in no sense specific, I at once join issue. It is certainly specific in this sense, that, in certain given conditions, it can produce in animals, and presumably in man, all the more important clinical and pathological manifestations of acute articular rheumatism. And if a definite organism can be isolated from cases of acute rheumatism, can be grown outside the body, and can by inoculation produce (in 60 to 70 per cent. of cases) lesions which it must be admitted are exactly identical with those seen in cases of acute rheumatism, and can then be recovered from these, it seems to me "bacteriology run mad" to say that because it ferments mannite or some other sugar, and possibly does not ferment inulin, that it is therefore a streptococcus of a certain species, and has nothing to do with acute rheumatism.

Then, again, it has been said that arthritis and endocarditis can be produced by the pyogenic organisms. Again, no one denies this. Every pathologist knows that in patients dying from pyæmia there may be both arthritis and endocarditis; but to the clinician rheumatism and pyæmia are quite distinct conditions, and surely those of us who have been working at this subject are not to be charged with mistaking one condition for the other. The arthritis of pyæmia is always purulent, does not tend to recover and then recur. In my experiments in not a single instance did I find pus in the joints, and recovery was the rule, while recurrence was frequent.

Poynton conducted a series of parallel experiments with the organism of rheumatism and the staphylococci, and I have carried out similar experiments with twelve different strains of streptococci. Our results seem to show conclusively that the organism has a certain specificity. My results have been published in the *Journal of Experimental Medicine*, and therefore I need give only a summary of the experiments conducted with various strains of streptococci, so that they may be compared with those already given with the organism of acute rheumatism.

Thirty-six rabbits were injected intravenously with the various streptococci. Only eight of these developed arthritis, which in every case was definitely purulent. One showed endocarditis, and in this animal there were in addition pyæmic abscesses in the kidney and elsewhere.

The experiments of Cole are perhaps more valuable. He inoculated fifteen rabbits intravenously with streptococci obtained from various sources. Eleven died within five days with general streptococcal infection; one died on the fifth day, but streptococci were not found in the blood; nine showed arthritis, and in four of these the exudation was definitely purulent; four showed excess of turbid (presumably semi-purulent) fluid in several joints, and in one the nature of the exudate is not stated. Only two showed endocarditis, and that only in the form of very minute vegetations. These results are particularly striking, for the experiments were undertaken to disprove the conclusions of Poynton and Paine, the other English workers. In Cole's work there are other interesting points which seem to me to strongly support the view I have placed before you, but I refrain from dealing with these to-night.

Further, in support of the bacterial or toxic hypothesis I would mention the occurrence of amyloid degeneration. I have recently described four cases of rheumatism, where there had been recurrent attacks over from seven months to several years, in which extensive amyloid degeneration was found; and in which, as far as was possible, all other causes of this form of degeneration were excluded.

I do not wish to sum up and make any dogmatic statement. Much more work and especially more control work is necessary to fully establish the position. The nature of the acid secretions of rheumatism, the nature of the acids produced in great abundance during the growth of the organism, the composition of the toxin produced, and other chemical problems remain to be solved, and their solution would help us greatly; but unfortunately the day has not yet come—may it dawn very soon—when every school of medicine shall have a fully qualified pathological chemist on its staff.

In conclusion, I would only say that the evidence in favour of acute rheumatism being a bacterial toxic disease seems to me overwhelming, and that the claims of the streptococcus, which has been isolated to the name *Streptococcus rheumaticus*, cannot easily be set aside.

Table I.

Intravenous injections of Streptococcus rheumaticus (Beattie).

23 rabbits injected. 17 positive results.

Arthritis (non-purulent) and endocarditis	9
,, (non-purulent) alone	3
,, (non-purulent) and acute interstitial nephritis	1
Endocarditis (large vegetations) alone	1
Chorea	1
Myocarditis and acute interstitial nephritis	1
Acute interstitial nephritis	1

Arthritis, 76 + per cent. Endocarditis, 56 + per cent.

Deaths.—3 = 17 + per cent. Of these—

1—Septicæmia with arthritis.
1—Very acute arthritis (no organisms in the blood).
1—Septicæmia with large mitral vegetations.

Table II.

Intravenous injections of Streptococcus (*various*) (Beattie).

36 rabbits injected. 14 positive results.

Arthritis (purulent)	8
Endocarditis with pyæmic abscess in organs	1
Septicæmia without local lesion	5

Arthritis (purulent) 36 + per cent. Endocarditis, 4 + per cent.

Deaths.—9 = 52 + per cent. Of these—

5—Septicæma without specific lesion.
2— ,, with pus in the joint.
1— ,, after seven days pus in joints.
1— ,, after eleven days—ulcerative endocarditis and pyæmic abscesses.

Table III.

Intravenous injections of Streptococcus (*various*) (Cole).

15 rabbits injected. 15 positive results.

Arthritis (purulent)	4
,, (semi-purulent)	4
,, (character not stated)	1
Endocarditis (very minute vegetations)	2
Septicæmia without specific lesion	4

Arthritis, 60 + per cent. Endocarditis, 13 + per cent.

Deaths.—12 = 80 + per cent. Of these—

4—Septicæmia without specific lesion.
6— ,, with pus or muco-pus in joints.
1— ,, in seven days with muco-pus in joints.
1— ,, in five days with turbid fluid in several joints.

THE ECLECTIC TREATMENT OF SKIN DISEASES.

By W. Allan Jamieson, M.D., F.R.C.P.Ed., *Knight of Grace of St. John of Jerusalem; Consulting Physician for Diseases of the Skin, Edinburgh Royal Infirmary.*

The stereotyped plan on which text-books of dermatology are composed is to divide the subject into principles and practice, more or less fully. The first of these is made up of separate chapters or articles on anatomy, physiology, etiology, pathology, symptomatology, diagnosis, treatment, and classification; the second is devoted to the consideration of the individual diseases themselves. Sometimes a section is added with formulæ. A notable departure has recently been made from this of such a meritorious kind, that it deserves more recognition than is generally accorded to a review.[1]

The monumental work conceived by Hebra and elaborated by himself in conjunction with his son-in-law Kaposi, was the first real attempt to place dermatology on an anatomo-pathological basis, and its influence has not yet ceased to be felt. Indeed, all succeeding treatises have been more or less founded on his. But within the last thirty years great progress has taken place in histo-pathology. By means of selective stains, observers have been enabled to isolate, after a fashion unknown previously, the component elements of the skin, to trace their connection, and to elucidate their origin. Towards this advance few have contributed more than the renowned dermatologist of Hamburg, Dr. Unna. Anstie, in his medical classic "Neuralgia and its Counterfeits," briefly alludes to the excellent work done by two Irish practitioners, the brothers Griffin, entirely apart from infirmary or dispensary cases on any extensive scale. In like manner Unna has never had the opportunity of watching numerous examples under such favourable circumstances, yet he has produced such a variety of valuable contributions to cutaneous literature as must astonish most hospital physicians. Though, in addition to numberless journalistic articles, Unna has written some voluminous dissertations, such as his "Anatomy of the Skin" in Ziemssen's "Handbuch," his "Histo-pathology of the Skin," and his "General Treatment of Skin Diseases," in Eulenburg's "Lehrbuch," yet he shrinks from publishing himself a complete compendium of his views. Instead of a text-book appearing as the maiden effort of a young aspirant to fame, he thinks that it should be the testament bequeathed to a succeeding generation as the culmination of a life's work. He has, however, yielded to the earnest desire of Dr. Iwan Bloch, who has won his spurs by his writings on syphilis, and agreed that he should prepare a conspectus of his opinions and teaching. Bloch has qualified himself for this by a comprehensive study of Unna's writings, by long residence in Hamburg, and by repeatedly taking part in his medical courses. He has thus identified himself with Unna's methods, with the further advantage of their having been subjected to the criticism of an independent mind.

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[1] "Die Praxis der Hautkrankheiten"; Unna's "Lehren für studierende und ärzte, zusammengefast und dargestellt," von Dr. Iwan Bloch, Berlin. Urban u. Schwarzenberg, Berlin, 1908.

In reading and criticising this volume, it must not be forgotten that it proposes to exhibit, in the main, the practice of one man. But in dealing with such a subject it is impossible to separate this from the subventions of other and previous or contemporary writers, whose ideas have become, through the medium of the press or in various ways, common property; and there is evidence that much of this has been assimilated and is reproduced, frequently with emendations, by Unna. Twenty-eight years have elapsed since he began to practise and teach dermatology in Hamburg, and during that time his methods have exercised a greater influence on the specialty than those of any other worker. His *Monatshefte* has appeared regularly twice a month for almost as long, and some of the most valuable articles and many most useful suggestions have seen the light in its pages, emanating either from the fertile pen of Unna himself, or from that of his numerous pupils and friends. It is indeed essentially a journal of practical dermatology.

Bloch introduces the subject by a brief but comprehensive sketch of the history of dermatology, devoting thereafter his first chapter to preliminary remarks of real importance on the anatomy and physiology of the skin. In this Unna has largely widened our knowledge. His ingenious explanation of the shapes assumed by the cells in the epidermis may serve as one illustration. Mechanical influences account for the variations in outline of the components of the several layers. The contour of the cylindrical basal cells arises from the marked productivity of this formative stratum, indirect nuclear and cell division constantly takes place, the daughter basal cells insinuate themselves between the older, and by pressure become vertically elongated. The generally rounded shape of the cells of the middle portion is due to the tolerably uniform pressure exerted on all sides by neighbouring cells, while proliferation simultaneously ceases. The horizontal broadening out of the upper supra-papillary prickle cells must be certainly referred to their approximation to the firm horny cuticle stretched out as a flat boundary film.

Again, a causal relation is known to exist between the sweat glands and the subcutaneous adipose tissue, and this can be accounted for as follows: Owing to the scattered arrangement of the muscular system of the sweat coil, a mutual exchange between the coil-gland secretion, which is a weak oily emulsion, and the surrounding lymph, is brought about, so that during absorption by the cutaneous veins, the fat containing lymph is filtered, the greasy constituents remain behind in the loose areolar tissue, accumulate there, and give rise to the development of fat cells in that locality.

Only in small details does Unna's scheme of the architecture of the skin differ from that currently held, but in the following chapter a wider vista is opened out. Bloch says that the technique of histological staining in combination with the microscopical analysis of skin diseases thereon based, furnishes a precise key to the pathology and treatment of cutaneous disorders. It is the indispensable foundation of scientific investigation and of bacteriology, since it deals with the elements on which are built the materials for clinical observation, and on which eventually treatment, if it be rational, operates. The problem to be solved therefore is how to bring out the relation between scientific dermatology and histo-diagnosis and histo-therapy. The intelligent groundwork for these two rests on the extensive employment of the principles of differentiation in applied histology, by means of special methods of coloration based on an exact theory of staining. This is not the place to enter into a minute description of the processes by which Unna produces those tints or contrasts through which are revealed the microscopic anatomy of the tissue elements; suffice it to say that all his latest devices are carefully formulated, and can thus be easily utilised by the experimenter.

An account of the fashion in which skin diseases outwardly manifest themselves follows a specification of their morphology. So many are the varieties, subsidiary forms, and rare types, that no other diseased territory can in this respect compare with the skin. To take one instance. We know that the normal epidermis, in its upper layers, constantly harbours a whole series of saprophytes. The same structure when diseased is still better adapted to provide a suitable soil not only for ordinary saprophytes but for the deposition of pathological micro-organisms, particularly if abnormally moist and loaded with decayed material, pus, etc. Mixed infection is thus of frequent occurrence. All instances of scabies among the poorer classes show such mixed infection. The variegated picture here presented is composed only in its smallest part of the burrows and clear isolated vesicles which arise from acarian irritation. The intense itching induces persistent scratching, and dirty nails inoculate the cuniculi with pus and eczema cocci, so that the greater part of the body is studded with papules and vesicles of eczematous type, with impetigo blebs, with pustules and boils. Hence the diagnosis is no longer comprehended in the word scabies, but ought to run—scabies plus eczema; scabies plus impetigo; scabies plus furunculosis. So that a pure uncomplicated scabies in a person of cleanly habits is liable to be misapprehended even by a practised eye.

In like manner, though lupus is occasionally serpiginous, the tendency to this peculiarity as a regular occurrence is more often attributed to syphilis. It is rather a characteristic which syphilis borrows from other cutaneous diseases prone constantly to encroach on fresh territory. Hence this marginal advance leads us to regard such as not pure syphilides, but as mixed infections with inflammatory dermatoses of other kinds particularly with seborrhœic dermatitis.

An appliance of some value in diagnosis was introduced by Unna under the name of the diascope. This is really nothing more than a plate of glass, which when pressed on a part of the skin over a bony prominence, or on a fold pinched up between the fingers, by temporarily displacing the blood, permits us to see something of the condition of the subjacent structures. Not only by its use can lupus be distinguished by the persistence of an ineffaceable smokiness from eczema which wholly fades, but in rosacea the larger venous varices can be picked out from the general capillary dilatation. The blood clot in the centre of a chilblain can be detected by its means, while the anomalous yellow coloration in seborrhœic affections can in like manner be appreciated, and the difference between cell infiltration and pigmentary deposition discriminated. In estimating the worth of the diascope, one must bear in mind that most of the disorders which attack the skin are superficial, and so we can gain information by a device which renders the integument more translucent, so that as an accessary to refinement of differentiation it is of a certain degree of applicability.

But the claim to special recognition of this treatise consists in the effort therein made to reconcile the histo-pathology of the skin with the rational treatment of its diseases. It is not enough, he says, to establish the diagnosis of a syphilide or a lichen, in order at once to prescribe mercury or arsenic. From the exact determination of the local condition, there emerges the precise indication for some one of our remedies. Chronic eczema well exemplifies the causal relation between histology and treatment. The microscope has taught us that in every true chronic eczema there are three cardinal histological symptoms—an abnormal state of cornification (parakeratosis), epithelial proliferation (acanthosis), and spongy transformation of the upper strata of the prickle-cell layer. The first is pathognomonic of eczema, the other two, if strongly pronounced, are chiefly accountable for its obstinacy. Commencing with the parakeratosis, it is evident that when a weeping surface studded with vesicles is exposed, our treatment must be an exsiccating one. But even when it is merely scaly, when the unassisted eye sees no excess of dampness, the microscope displays an immoderately moist transition zone, whose presence is the primary cause of the scales. Therefore a powerfully drying paste is indicated, in particular Unna's zinc oxide, sulphur, silica paste, and its efficacy in this respect explains its extensive employment in eczema. In the prominence and density of old-standing patches of eczema used to be seen the expression of marked cell infiltration of the cutis. The microscope teaches us that these clinical peculiarities run parallel with local epithelial proliferation, and we therefore have recourse to such remedies as experience proves thin down the epidermis, to the alkalies and salicylic acid. Thus the rationale of the addition of salicylic acid to so many of the prescriptions for eczema is explained. The eye, educated by the microscope, perceives, under the firm, corneous covering of partially cured eczema, a spongy degeneration of the prickle layer still persisting, which renders recurrence probable if treatment is intermitted. On immoderate intercellular humidity, zinc oxide, sulphur, or other drying agents exert no influence, but it is accepted that relapses from this cause are best obviated by tar and pyrogallol, and we can hardly err if we ascribe to these drugs a favourable influence in the direction of getting rid of the spongy degeneration of the prickle-cell layer of the epidermis.

It thus appears that the true basis of treatment in general is furnished by individual indications connected with changes in the anatomical, physiological, and pathological elements of the skin. As already hinted, Unna's system of the treatment of skin diseases is one of indications. The estimation of each individual indication leads simultaneously to that synthesis of therapeutic appreciation and that analysis of disease forms which makes the quintessence of our posological experience. Thus our best dermato-therapeutic remedies have this elective effect, that they influence for good only the morbid area, without implicating or harming the sound tissues in the neighbourhood. Unna has specially enriched and refined the methods of drug application, and so has immensely advanced rational aids to cure. Thirty years since, powders, lotions, and ointments composed our dermato-therapeutic armamentarium; we now possess in addition a vast array of preparations, such as varnishes, soluble and insoluble in water, medicated soaps, pastes, jellies, salve muslins, plaster muslins, etc., which permit a specialisation of medication heretofore undreamt of, so that any portion of the body can have its peculiarity studied and suited. The scheme of indications necessitates division into three groups; the first of these deals with the skin in general; the second with the epidermis and its adventitia; the third with the cutis and the subcutaneous tissue. This will be best understood by reproducing examples of the mode in which Unna handles them.

Heat and cold alike exert a decided effect on the skin, the former a much more beneficial one than the latter, since in warm weather, climates, or rooms many diseased states improve. But of far greater consequence is shielding the integument from the chemical rays of the spectrum. The painful sunburn arising from reflection from snow or glacier may be simply obviated by applying casein ointment or gelanthum coloured with curcuma or red Armenian bole, which forms a varnish easily washed off. In the tropics protection is obtained by wearing yellow or brown underclothing. In the same way blue or green spectacles or veils ought to be replaced by brown or smoked glasses in the one case, and by yellow, red, or brown veils or parasols in the other. As a protection for the hands from the injurious X-rays, a zinc jelly containing 10 per cent. of cinnabar painted thickly on and covered with a thin layer of absorbent cotton-wool, has proved thoroughly efficient.

Friction of contact surfaces so detrimental to the cure of skin affections can be prevented by rubbing tannin on the parts, painting zinc jelly over this, and lightly coating with absorbent cotton-wool. This procedure renders the jelly insoluble in water. For surgeons' hands, Unna recommends a combination of Furbringer's alcohol disinfection, employed at night; and washing in the morning with superfatted soap, the resulting lather being only partially wiped off with a dry sterilised towel. This plan guards especially from the irritation of corrosive sublimate solutions.

Pressure suitably applied has always been recognised as a useful adjunct to the management of cutaneous disorders. Where bandaging cannot be employed, we may substitute collodion, and it is important to remember that this does not interfere with the efficacy of salves or the use of soaps on the affected areas, since the film produced is to some extent permeable by these. Thus in lupus erythematosus in irritable cases we may paint on collodion containing 25 per cent. of ichthyol; for indolent ones a neutral collodion to which from 2 per cent. to 4 per cent. of green soap has been added. We have thus pressure and medication at the same time.

It is often desirable to relieve the distressing sensation of burning in the skin met with in certain congestive and inflammatory states. For this cold cream has been in vogue even since the time of Galen, probably long before. Its action depends on the mutual combination of fat and water, which permits of evaporation. Various formulæ are current, but the one Unna advises has the following simple composition: ℞ Adipis lanæ, ol. amygdalæ, āā 1; aq. aurantii flor., 2. A valuable cooling paste runs thus: ℞ Ol. lini, liq. calcis, āā 2; zinci oxidi, cretæ præpar., āā 3.

Anti-pruritic agents are among those most sought for by patients and aspired after by the attendant. It is not yet explained whether these influence exclusively the nervous apparatus, or act conjointly on the other tissue elements. The chief cause of itching is a disproportion between the amount of lymph and tissue juices and surface pressure. The purely nervine anti-pruritics are of limited applicability, though a solution of pure cocaine in ether, and a nicotine soap, have proved of service in Unna's hands. That the latter alkaloid is absorbed seems proved, as in children a first application almost always occasions vomiting. The tars and their derivatives appear to act as a varnish reservoir, from which minute quantities are gradually absorbed into the skin. On this salient topic, however, one must refer the reader to the original, as the suggestions are too numerous for quotation or abstraction, and cannot be studied or digested apart from the context.

One of the sections is headed "Pellicle-forming Substances" (*Pagotica,* from *παγόω,* to coagulate). When spontaneous cornification lags, be this in the case of large ulcers, in fissures, or in simple erosions of the rete mucosum, traumatic, or intertriginous, it is desirable to convert the fluid or semi-fluid constituents of the skin into a temporary coherent lamina. Cauterising agents in dilute form exert an astringent effect, and some which coagulate albumin are capable of originating a filmy investment over the exposed surface, but in practice only nitrate of silver and chromic acid are adapted for this purpose. The former is well known and extensively used; the latter, owing to the pain it occasions, cannot be employed over large areas. The strength of the aqueous solution may be from 5 per cent. to 20 per cent., and the subsequent application of alcohol makes the coagulum much firmer, while by reducing the excess of chromic acid it renders it inactive. Boeck suggests a nitrate of silver solution after the chromic acid one, for a similar reason.

The chemical reaction of the skin has a certain importance. This, apart from the glandular secretions, is largely due to the acidity of the epithelial protoplasm. This is most strongly expressed on the leg and forearm, and in these localities the cure of eczema and psoriasis is delayed when chrysarobin is employed for this object. Alkalies are known to accelerate the action of this drug, and Dreuw has compounded an ointment which enables the simultaneous effect of alkali and chrysarobin to be produced—℞ Acidi salicylici, 10; chrysarobin, ol. rusci, āā 20; saponis viridis, vaselini, āā 25.—*M.*

An example of the elective mode of dealing with abnormal skin conditions may be drawn from the section entitled "Means of getting rid of Exudation in the Prickle Layer." The induction of active mitosis formation is essential to the repair of epithelial deficiencies, but of equal consequence in many cases is the removal of mechanical hindrances, which counteract the speedy restitution of a normal prickle layer. Here there is no intercellular substance, as in the cutis, only exudation. It might be thought that, given time, the surface epithelium could rid itself of this and restore the original balance. So far as relates to the epithelium this is correct, but we must take into account the corium, whose resistance, as we have seen, is in part answerable for the external shape of the cells. A simple serous vesicle of the epidermis is situated between the cuticle and the basal prickle cells, and, if small, does not disturb the papillary portion of the corium. The pressure exerted by the exuded fluid may lead to a concavity of its surface as well as to a convexity of the cuticle, and it depends on the amount of the counteracting opposition of the cutis whether this is entirely recovered from when the vesicle heals. Probability is in favour of this, the resilience of the felt-like cutis being sufficient. Thus, in eczema, the parakeratotic state of the epidermis promotes the emptying of the vesicles, the scratching usually ruptures them, while the concomitant acanthosis goes for rapid reconstruction.

Should, however, the vesicle lie under a tough cuticle, as in eczema or dyshydrosis of the palm, conditions alter. The vesicle bores more deeply into the corium, yet here also the temporary depression left in the epidermis gradually fills up.

If the contents of the vesicle coagulate and combine with the superimposed horny layer to form a hard crust, circumstances again change. This takes on a peg shape and forms a sequestrum, which, though eventually loosened and detached, leaves a subsidence of tissue, resulting in a permanent pitted scar. Such occurs in smallpox, owing to an unfortunate combination of events; the coagulation of the exudation in the epidermis establishing a transient deformity of the papillary body, which cornification renders permanent. Hæmorrhage into the epidermis does not necessarily lead to scarring. A coagulum is formed, but the neighbouring epidermic cells do not fully cornify, and on the eventual casting out of the clot, no pit-like depression remains, even although the coagulum has had a long stay in the epidermis.

Two factors unite to occasion durable pitting of the surface, through paralysis of self-curative power—coagulation of the exudation in the epidermis, and cornification of the enveloping young prickle cells. It is thus an error to leave to natural cure any coagulated epidermic exudate, as in variola. The incrustations should, as early as possible, be removed by mechanical measures or by maceration. In direct conflict with the popular idea that the pitting of the face in smallpox is unavoidable, it is our duty to obviate scarring through neutralisation of crust formation. So by warm dressings or by mercury plaster muslin, we ought to increase the tendency to pustulation, and impair the tendency to form a firm coagulum, while at the same time promoting the early separation of the crusts. These indications can be carried out by keeping the parts constantly soaked by antiseptic oil dressings (softening measures); or by early cauterisation with alkalies, or oil dressing containing ichthyol, endeavour to prevent coagulation; or by mechanical removal of the crusts and subsequent application of salicylic plaster muslin, try to repair the damage done. Sometimes we can by timely employment of reducing remedies, as the zinc sulphur paste, or zinc resorcin paste, stifle the inflammation in the bud, and anticipate the outpouring of a fibrinous exudation (abortive treatment).

Under the head of "The Corium and Subcutaneous Tissue," we find "measures to get rid of hæmorrhage into the skin." Here it is remarked that the discovery of apparently specific bacilli in the blood in purpura, has so far led to no advance in treatment. It is otherwise as regards the symptomatic removal of blood already effused. We possess in arnica a reliable drug to bring about rapid absorption. The powdered flowers may be given, or 5 drops of a tincture every two hours. It does not matter in what way the blood escaped into the tissues. Most striking is the effect in very large blood suffusions, which occur after crushes or bruises, where there is danger of bursting with resulting sepsis. (It might be worth while to study the effect of arnica given in this way on hæmorrhages into the eye or brain.) Pressure and the recumbent position are valuable accessories.

One of the most valuable chapters is the ninth, which provides, in short compass, a résumé of Unna's dermato-therapeutic application methods. The extraordinary advance in dermato-therapy during the last quarter century depends not solely on the more rational foundation of treatment, or the discovered relationship between microscopic analysis and diseased change, nor on the scientific investigation and theoretic explanation of the mode of action of individual drugs, but in great part on the improvement in and refining of well-tried medicaments, and the discovery of fresh plans of applying these; on the emendation of vehicula, so that the possibility of differentiating and particularising treatment in all cases is simplified, to the end that one can bring into operation many curative methods adapted to the peculiarity of each part of the body.

In order that the reader may be induced to study and assimilate this chapter for his own behoof and still more for that of his patients, we may whet his appetite by a few quotations.

An early suggestion of Unna's was the ether and alcohol spray. Drugs soluble in this mixture can not only be employed in far smaller quantities than if used in lotion or powder, but can be brought into much closer approximation with the affected areas, while the force used in atomising aids penetration. The cuticle poor in water is better suited for this medium than the deeper epidermis and corium, rich in aqueous constituents. It is thus admirably appropriate for the lips, or for the buccal cavity and tongue kept wet by normal secretions. The compound spray dries up most tissues by absorbing water. The spray is of great service—(1) When narrow cavities or otherwise inaccessible situations demand treatment, or on the scalp, when the hair has not been removed. (2) Fissures or ulcers are readily dealt with by its means. The proportion of alcohol to be added to the ether must be limited, since it lessens volatility and diminishes the penetrative power. One per cent. of iodoform or of corrosive sublimate are average strengths, while for the scalp a resorcin spray, for instance, may run—℞ Resorcini, 4; ætheris sulph., 33; glycerini, 2; sp. vini rect., 170.

Lassar's well-known paste possesses, according to Unna, greater lubricating than desiccating properties. By altering the excipient and returning to lard in place of vaseline, and adding a siliceous earth, one having more drying characteristics is obtained. This is Unna's pasta zinci vulgaris—℞ Zinci oxidi, 24; terræ siliceæ, 4; ol. benzoinat, 12; adipis benzoinat, 60.—*M.* A zinc sulphur paste made from this by the substitution of 10 parts of precipitated sulphur for as many of oxide of zinc, is of equal efficacy with Lassar's paste in respect of mild and lasting action in acute and chronic eczema, in impetigo vulgaris, and many other inflammatory skin affections, while it excels it in rapidity of effect. It is especially indicated as a commencing treatment in all moist and scaly eczemas, it restores the softened cuticle quickly to normal, and is only contra-indicated in the very dry form of pityriasis on the face and in verrucose and callous eczemas. The papulo-vesiculous and the erythemato-squamous eczemas hardly require any other treatment, the copiously oozing dry up under its use, and even palmar eczema improves when it is applied under an impermeable dressing. For the very troublesome eczema of the hands and fingers, as also for the painful fissured eczema of the anus and scrotum, Unna recommends a lead paste—℞ Amyli oryzæ, 10; lithargyri, glycerini, āā 30; aceti, 60.—*M.* Coque, ad 80. Cooling pastes on the principle of cold cream can be prepared, and one largely favoured by Unna is as follows—℞ Calc. carbon. præcip., zinci oxidi, āā 20; ol. lini, liq. calcis, āā 30.—*M.* This he terms his pasta zinci mollis. Equal parts of this and of pasta zinci sulphurata form a soft and widely applicable paste.

It is frequently advantageous to have a varnish which when applied to the skin will neither be greasy nor markedly noticeable in itself, and still will permit of the incorporation of other and more active or soothing ingredients, without injury to its own consistence. This is eminently present in gelanthum, compounded thus—℞ Gelatinæ liquidæ, tragacanthæ, āā 2·5; glycerini, 5; aq. distil., 90; acidi benzoici art., 0·3; ol. rosæ gutt., 1. In the treatment of the face this may be further transformed into a gelanthum cream—℞ Zinci oxidi, 5; vaselini alb. american., 10; gelanthi, 85; f. emulsio, add ext. jasmin., ext. syringæ, āā 0·5.

Unna's confidence in the efficacy of various medicated superfatted soaps is not perhaps shared in to the same extent by others, but he maintains that the persistent use of his ichthyol soap will cure rosacea, and Bloch adds his testimony to the value in that and in acne of the peroxide of soda soap. Its employment brings about a complete alteration in cornification, secretion, and circulation, and confers on the skin a natural appearance, even when the chief disturbances in the follicular areas are not yet recovered from. These are, however, strongly attacked by the soap, soften rapidly, and are absorbed or dissolved in proportion to their size and consistence.

The last third of the volume, embracing more than 250 pages, is taken up with the special pathology and treatment of individual skin diseases or groups of skin diseases after the conventional fashion, though here also the imprint of Unna's personality is plainly traceable. Eczema, a topic which he has specially made his own, occupies about sixty pages, but then the term includes ailments not universally held to be eczematous. Under its ægis we find not only the integumentary catarrh to which the name is currently attached, but seborrhœic dermatitis, rosacea even when that has reached the stage of rhynophyma, and psoriasis. He holds firmly by its parasitic nature, accounting for the sterility of the early vesicle by chemiotactic origin. The view is supported by many and ingenious arguments, so that one is almost persuaded of its correctness. The section is one which not only from the evident earnestness which pervades it, but from the practical hints and suggestions with which it literally bristles, is worthy of the most careful and repeated study.

Syphilis, as one would expect, is treated by Bloch from the newest standpoint. Though the discovery of the *Spirochæta pallida* has not yet materially transformed our conceptions, yet, as he remarks, there are probably stages of development of the organism which are not accessible to the specific action of mercury. In this way we may explain the frequent failure of mercurial medication, as well as the surprising fact of the recurrence of evident syphilitic symptoms after a latency of many years. A more exact acquaintance with the conditions of life and development of the cause of syphilis will furnish us with indications for a more precise mercurial treatment than we now possess. We may then attain a definite estimate of the value of intermittent treatment, as well as of the differences which assuredly exist between the effects of mercury, iodide, and arsenic.

While no distinct allusions are made to serum-therapy, Dr. Paul Wichmann contributes a useful description of the Finsen-Röntgen-radium treatment, and a very full index enables one to refer with ease to any subject mentioned in the volume.

In conclusion, we may employ a simile. We may compare this treatise, unique in its way, to the account given by Homer of the garden of Laertes in Ithaca. Odysseus, prior to making himself known to his father, observes—

> "ὦ γέρον, οὐκ ἀδαημονίη σ' ἔχει, ἀμφιπολεύειν
> ὄρχατον, ἀλλ' εὖ τοι κομιδὴ ἔχει, οὐδέ τι πάμπαν,
> οὐ φυτόν, οὐ συκέη, οὐκ ἄμπελος, οὐ μὲν ἐλαίη,
> οὐκ ὄγχνη, οὐ πρασιή τοι ἄνευ κομιδῆς κατὰ κῆπον."
>
> *Odyssey*, Book XXIV. ll. 244–248.

Adopting the rendering in Butcher and Lang's "Translation," with one slight alteration, the passage runs thus—

"Old friend, thou hast no lack of skill in tending a garden; lo, thou carest well for all, nor is there aught whatsoever, either plant or fig-tree, or vine, yea, or olive, or pear, or garden bed in all the close, that is not well seen to."

And indeed this work of Bloch's is a veritable garden and orchard, one in which many useful scientific plants, herbs, and trees are brought to a high state of cultivation. We here met with numerous early acquaintances somewhat altered by the gardener's skill, and we encounter a mass of new varieties, whose properties are not yet, perhaps, wholly determined, but which give good promise of future utility. We have, in the preceding pages, rather rudely plucked some specimens, torn out from their associations or habitat, and have offered them for our readers' consideration apart from the context. Seen in their natural surroundings, they can be examined and studied with far greater profit. It is to be hoped that some enterprising publisher may render the work more widely accessible in an English translation, and should such be found, we are sure that plenty will take the opportunity thus afforded of wandering, not unprofitably, through a wilderness of information.

THE MICRO-CHEMICAL TESTS FOR SEMEN.

By Professor Harvey Littlejohn and Dr. J. H. H. Pirie, *Assistant in the Forensic Medicine Department, University of Edinburgh.*

A chemical test which infallibly indicated the presence of human seminal fluid would be a discovery of great medico-legal importance. Notwithstanding many attempts to solve this problem, the sole reliable means of recognising seminal fluid consists in detecting the presence of spermatozoa. In cases where the material to be examined consists of mucus from the vagina or dried crusts of semen adhering to the pubic hair or some article of clothing, little difficulty is, as a rule, experienced in obtaining this necessary proof. When, however, the material to be investigated consists of dried stains upon linen or a similar fabric, then the finding of the characteristic organism may be by no means an easy matter. It is true that spermatozoa may remain in a good state of preservation for many years, and under favourable conditions their presence in such stains can be demonstrated by means of the microscope. Sometimes, however, even in undoubted stains of quite recent origin the search is unsuccessful. This failure may be due to various causes, some of which may depend on the procedure adopted by the examiner, such as insufficient maceration of the stain or from taking for examination a portion of the periphery of the stain instead of the centre, or, again, from confining his examination to only one area instead of taking samples from various portions of the stain. The necessity for this is well known, because the marginal zone of a stain results from a diffusion of the fluid in which the spermatozoa do not participate, while, on the other hand, the organisms are often unequally distributed, and may be absent in one portion although present in another.

One of the chief causes of failure, however, is owing to mutilation having rendered their identification impossible. This arises chiefly from the handling which the garment frequently undergoes before it is received for examination. Nothing interferes so much with the successful finding of spermatozoa as careless and frequent handling. In this way the dried material in the stain is rubbed off or the spermatozoa become broken and mutilated, so that a definite diagnosis cannot be made. Finally, it must be kept in mind that we may be dealing with a case of azoospermia.

Not infrequently for the above reasons, in cases of criminal assault in which the seminal nature of certain stains would, if proved, be a fact of prime importance, the examiner is unable to obtain the only conclusive proof.

The possession of a reliable and certain chemical test for semen would thus be of great advantage in medico-legal cases, more especially if such a test were specific for human semen. So far, however, such a test has not been discovered, but during recent years two micro-chemical reactions have been proposed, which, although they have not justified all that was hoped from them at first, yet afford evidence of the presence of semen, and possess considerable value as preliminary tests in the investigation of stains. The first of these in point of time is the reaction suggested by Florence (1) of Lyons in 1895. This consists in adding to seminal fluid or to a watery extract obtained from a dried stain, a drop of the following solution:

Iodine	2·54
Potas. iod.	1·65
Aq. dest.	30 c.c.

The best method of application is to place a cover-glass over a drop of the stain extract, and then to allow a drop of the above reagent to run under the cover-glass and mix with the fluid. Almost at once, if semen is present, there will be seen with an ordinary low power of the microscope, but better with a magnification of about 350, an abundant formation of brown rhombic acicular crystals. These remind one as regards colour, and also to some extent in their form, of hæmin crystals, but there is no very close resemblance. The formation of crystals occurs almost immediately, unless the solution of semen is extremely dilute, when they may be few in number and take one or two minutes to form.

The crystals are best seen and are most numerous as a rule along the margin of the iodine solution, and often with the naked eye we may anticipate a positive reaction from the dark line of precipitated crystals in this position. The crystals quickly redissolve, so that the reaction must be looked for at once. The age of a stain does not seem to affect the success of the test,—we have obtained positive results from stains many years old,—and even where no spermatozoa are discoverable it will give a positive result. The reaction is held to depend on the presence of cholin.

Unfortunately, it has been found that other animal secretions and extracts of organs of the body likewise give a positive reaction, so that the great importance which was at first claimed for the test can no longer be admitted. It has, however, a distinct value, inasmuch as when a garment presents a number of stains and is much soiled, as is frequently the case with the under-clothing of the poorer classes, Florence's reagent may be used with advantage as a preliminary test. It will thus enable us to select from the many stains of a more or less suspicious character those which are likely to repay the time and labour involved in a search for spermatozoa.

We have also found its application advantageous simply as a stain for the cell elements, etc., usually found in an extract of such stains. The difficulty of thoroughly examining such a clear fluid is considerable, but after the addition of an iodine solution all the cells and other elements become sharply defined, while any spermatozoa present are likewise stained and rendered more easily discoverable. As a matter of routine, we always, after first looking for spermatozoa in the clear watery solution, add a drop of Florence's reagent, and are thus often enabled to see sperms which had before eluded observation.

In 1905, Barberio (²) brought forward a new chemical test which he claimed to be specific for human semen. This consisted in the addition to semen, or to a watery extract of a seminal stain, of picric acid in concentrated watery or alcoholic solution. Upon the addition of this reagent there follows at once, or within a few minutes, the formation of abundant yellow crystals, chiefly of a rhombic needle shape, but varying considerably both in size and form. With the exception of the preparation known as Spermin (Poehl), Barberio found the reaction specific for human semen. He failed to obtain it with the semen of the lower animals, or with extracts of various human organs.

Cevidalli (³), in a paper dealing with the reaction, gave a similar description of the crystals, but stated that they are often only small oval bodies, crystalline, but without definite crystal shape. He found that various modifications of the test solution gave the reaction, as, for example, Esbach's solution, picrate of ammonium and glycerin-alcohol solution of picric acid. He gave preference to the last, on the grounds that there was less likelihood of picric acid crystals interfering with the recognition of the reaction, and because it diminished the risk of excess of the fluid to be tested, or of the reagent nullifying the result. The preparations are also more permanent owing to the diminished effects of evaporation.

Cevidalli corroborated Barberio's statement, that the reagent appeared to be specific for human semen, and also showed that Florence's reaction could be obtained in the same specimen after Barberio's reagent had been applied. He is of opinion that the reaction is dependent on the presence of protamin.

Levinson (4) describes the crystals as of a yellow colour, rhombic in form, and resembling Charcot-Leyden crystals, and states that the reaction appears to be specific. He obtained negative results when tests were made with the semen of the dog, horse, pig, rabbit, cavy, and mouse, as well as with various secretions and extracts from organs of the human body. With regard to the question of protamin being the constituent in semen to which the reaction is due, he obtained no reaction with the semen of the herring, mackerel, or pike, in all of which abundant protamin is present. He obtained crystals from seminal stains four years old, as well as with putrified semen, and semen preserved by means of chloroform, alcohol, and formalin. In cases of azoospermia positive results were obtained. With the view of determining to which constituent of the seminal discharge the reaction is due, he tested the juices of the testicle, seminal vesicles, prostate, and Cowper's gland, but got no reaction either when these were tested separately or mixed. In two cases, however, the discharge obtained by massage of the prostate gland in living persons gave positive results. He attributed the reaction to some constituent of the prostatic secretion, and possibly also of the seminal vesicles.

Bocarius (5) also states that the reaction appears to be specific for human semen. He describes various modifications of the test solutions whereby one may obtain larger crystals, and of a more definite crystalline shape. He obtained them in the form of large rhombic needles and plates by using a solution of picro-nitric acid to which had been added either acetic acid or cadmium iodate.

Our experience of the reaction has been almost entirely with Barberio's original reagent—a concentrated watery solution of picric acid. Cevidalli's glycerin-alcohol solution was not found nearly so satisfactory, and we frequently failed to obtain typical crystals with this solution in cases in which a positive reaction at once resulted with a watery solution.

In the examination of a suspected stain the procedure is as follows:—A small piece of the stained fabric is placed upon a glass slide and allowed to macerate in a drop or two of distilled water. The length of time of the maceration depends on the age of the stain. To the solution thus obtained, or a portion of it,—it is advisable to allow it to concentrate by evaporation for a short time,—a small drop of the reagent is added by means of a platinum loop. After waiting for a minute or two, a cover-glass is applied, and the preparation examined under the microscope. In positive cases the mixture usually appears cloudy to the naked eye, but this may also be seen in negative tests, since it is due chiefly to a precipitation of albumin. On examining the preparation with a magnification of 350 or more, if the reaction is positive, crystals will be seen either at once or appearing in the course of a minute or so. As a rule, they are present only in certain parts of the specimen, but they may be abundant and distributed throughout the preparation. With a little practice they are easily identified and distinguished from picric acid crystals or those due to other conditions.

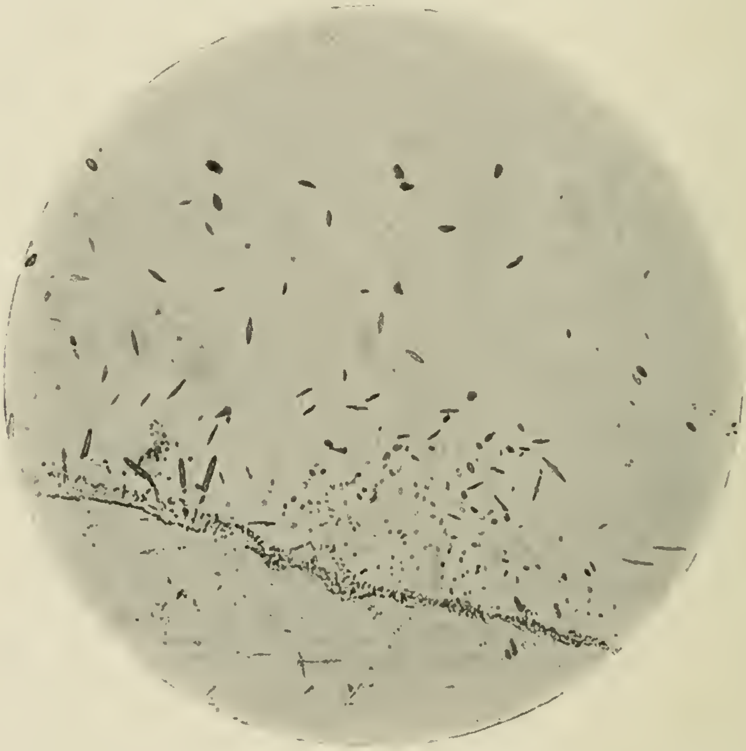

FIG. 1 (× 160).—In the centre a large number of the small ovoid crystals are to be seen, while beyond this area, and distributed over the field, there are many of the larger rhombic needle-shaped crystals. The large crystals to the left of the transverse line, and also those below it, are picric acid crystals.

We found that gently warming the fluid to be tested in some cases aided the reaction, although at the same time it tended to promote the formation of picric acid crystals. Instead of adding the reagent to the fluid before putting on the cover-glass, it may be added as described in connection with Florence's test, by putting a drop at the edge of the cover-glass, when the crystals will be seen to form along the line of mixing of the two fluids. In appearance the crystals are yellow, but not of such a bright colour as those of picric acid itself. In size and shape they vary considerably; in length they range from 5 to 20 μ, but they may be less or more. Sometimes they largely consist of quite small ovoid bodies, which during the period of formation often have a Brownian movement, and they may be confused with cocci, spores, nuclei, etc. Along with these there are generally larger crystals, ovoid or needle-shaped with rounded ends, and the development of these larger crystals from the small round-shaped bodies may often be followed under the microscope. When fully developed, the crystals have the form either of obtuse or sharp-ended needles, or of rhombic prisms frequently crossed by a refrangent line at their equator. Sometimes crosses are formed, and more rarely stars.

The illustration shows the appearance presented by them in a typical specimen.

Spermin crystals are liable to be mistaken for Barberio's crystals. The former are, however, larger, and are not yellow, although this is not always readily made out in the yellow picric solution. They would be seen in the material examined before the addition of picric solution, and hence may be easily differentiated. As is the case with Florence's reagent, no harm can result from the application of this test, however limited the quantity of material at disposal for examination, since the picric solution stains the spermatozoa and renders them, as well as the cell elements, more easily distinguishable.

The material which we have examined included ten seminal stains, one eight years old, another three years, and the rest of recent origin, on linen or cloth, and all of these gave positive results both with Barberio's and Florence's reagents. In thirty-three cases, the fluid escaping from the meatus urinarius after death, or which was removed by means of a catheter from the lower part of the urethra, was tested. All the specimens except six contained spermatozoa. Twenty-six gave a positive Florence reaction and twenty-eight a similar result with the Barberio test. Of the seven which were negative to Florence, three were also negative to Barberio, although all of these latter specimens contained spermatozoa. The other four specimens which gave a positive Barberio reaction showed spermatozoa in three, while in one none could be found. Of the five specimens which were negative to Barberio's test, three were also negative to Florence's, while the remaining two specimens gave a positive Florence reaction. It is very doubtful whether such fluid obtained from the urethra after death is equivalent to ejaculated semen, but it must be taken as proved that neither Florence's nor Barberio's reaction depend upon the presence of spermatozoa for their production—a fact which has been noted by other observers. With the view of ascertaining which constituent of semen is the active agent, we repeated Levinson's tests upon the various glands of the urogenital tract. The results obtained differ from his, and are as follows:—

Testicle.—Juice expressed from this organ was examined in ten cases, and in all of these Barberio's reaction proved negative. Florence's test was positive in one instance.

Seminal vesicles.—The fluid expressed from these contained abundant spermatozoa, and was tested in ten cases. Florence's reagent gave a positive result in five. With Barberio's test three gave a well-marked positive result, and one, doubtful crystals.

Prostatic juice was examined in eight cases. Florence's reagent gave a positive reaction in seven, while Barberio's was positive in six cases, and gave a doubtful positive result in the two others.

Cowper's glands were dissected out in four cases, and the gland secretion tested. Florence gave a positive result in one case, and Barberio was positive in all.

Although these results are not conclusive, the probability seems to be that the reaction is due to a constituent occurring in the secretion of the prostate and of Cowper's glands. It will be noticed that in contradistinction to the observations of Levinson and others, we obtained positive results with Barberio's reagent in all of the four cases in which the secretion of Cowper's glands was tested. The crystals obtained in these cases were abundant and typical, except that they were, as a rule, small in size. The results afforded by tests with the contents of the seminal vesicles are somewhat contradictory, inasmuch as out of the ten specimens examined, four only gave a positive result with Barberio's test. It is possible, therefore, that the specific substance, whatever it is, may also be present in the contents of this organ.

We have also tested various other fluids—urine, sputum, gastric contents, pus, cerebro-spinal fluid, hydrocele fluid, chyle, and vaginal discharges in various cases—and all gave negative results both with Florence's and Barberio's reagents.

We have not tested other animal semen except that of the rat, rabbit, and monkey. The rat and rabbit gave negative results. In two monkeys, ejaculated semen was not obtained, but fluid from the urethra, testicle, seminal vesicles, and prostate all gave negative results with both the Florence and Barberio tests. In both cases, spermatozoa were present.

From what has been stated, it will be evident that Florence's reaction can lay no claim to be regarded as specific for semen. A positive reaction may be obtained with other substances than semen or juices from the glands of the genital tract. Its value lies more in a negative than a positive result, when employed as a preliminary test in cases where garments are much soiled. Barberio's reaction has stronger claims to be regarded as specific. So far as we are aware, a positive result has not been obtained with any of the ordinary fluids or juices of organs likely to cause stains on clothing, and our experience, so far as it goes, as well as that of several other observers, indicates that it is specific, if not for semen, at least for the secretions of the genital glands.

Further observations require, however, to be made before a conclusive opinion on this point can be formed. In any case, Barberio's reaction has an equal value with that of Florence as a preliminary test, and, when positive, affords stronger evidence as to the seminal origin of a stain.

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RECENT RESEARCHES INTO THE ETIOLOGY OF PLAGUE IN INDIA, WITH AN ACCOUNT OF THE WORK OF THE PLAGUE COMMISSION RECENTLY APPOINTED BY THE GOVERNMENT OF INDIA, WHEREBY IT IS SHOWN THAT THE RAT-FLEA IS THE CAUSE OF PLAGUE EPIDEMICS IN THAT COUNTRY.[1]

By Lieut.-Colonel W. B. Bannerman, M.D., B.Sc., F.R.S.E., *Indian Medical Service; Director, Bombay Bacteriological Laboratory.*

The Plague Research Commission, of whose work I am to give an account, was appointed by the Right Hon. the Secretary of State for India, acting on the initiative of the Government of India, who had moved in the matter in the autumn of 1904. To assist in the guidance of the work, an Advisory Committee in London was appointed by him in consultation with the Royal Society and the Lister Institute of Preventive Medicine, and was composed as follows:—

Surgeon-General A. M. Branfoot, C.I.E., I.M.S., President of the Medical Board, India Office, Chairman. Sir Michael Foster and Dr. J. Rose Bradford, representing the Royal Society; Colonel David Bruce, C.B., R.A.M.C., and Dr. Charles J. Martin, representing the Lister Institute—Members. After the death of Sir Michael Foster in January 1907, his place was taken by Dr. G. H. Nuttall, F.R.S.

This London Committee appointed a working Commission in India as follows:—

Major G. Lamb, M.D., I.M.S., Director of the Pasteur Institute of India, Kasauli, Senior Member; Captain William Glen Liston, M.D., I.M.S., Assistant to the Director Bombay Bacteriological Laboratory; Captain T. H. Gloster, M.B., I.M.S., formerly Port Health Officer, Rangoon; G. F. Petrie, M.D., Assistant Bacteriologist, Lister Institute; Sydney Rowland, M.R.C.S., L.R.C.P., Assistant Bacteriologist, Lister Institute; Assistant-Surgeon M. Kassava Pai, M.B. (Madras); V. L. Manker, L.R.C.P. & S. (Edin.), D.P.H. (Camb.); Hospital-Assistant P. S. Ramchandrier, and Hospital-Assistant C. R. Avari. It will be noticed that, with the exception of the two bacteriologists sent out from the Lister Institute, the personnel of the Commission was connected with the medical services of the Government of India, and that four were natives of India. This fact should prove of interest to politicians in these days of travelling members of Parliament.

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[1] A paper read before the Edinburgh Medico-Chirurgical Society, March 1908.

The Commission had its headquarters in Bombay, and was given laboratory accommodation at the Bombay Bacteriological Laboratory at Parel. Dr. C. J. Martin, the Director of the Lister Institute, went to India in the end of March 1905, and organised and started the work at Parel, after satisfying himself by personal inspection of the other Indian laboratories, that, on account of the presence there of a trained and organised laboratory staff and ample supply of animals, it was the only place in India where work on the scale contemplated could be carried out. He returned to England after six months, and since then the head of the Commission has been Major G. Lamb, I.M.S.

The major part of the experimental work was carried out in Bombay city, but most essential investigations were, in addition, conducted in two small villages in the Punjab, where facilities existed for watching an epidemic with some approach to accuracy.

At this point it will be instructive to consider the extent of our knowledge of plague, as derived from Indian experience, at the time the Commission arrived in India.

The present manifestation of plague in India dates from the autumn of 1896, when the first case was diagnosed by Dr. Viegas, a well-known medical practitioner in Bombay. We knew that plague appeared in the remote valleys of the Himalyas, in the region of Kumaon, in sporadic form from time to time, and that the people there deserted their villages on its approach; but that it had any practical significance for the medical man in India no one imagined. It was regarded as in the nature of an antiquarian curiosity belonging to these old-world regions, and for ever banished from the civilised country of Hindustan. It followed, then, that the average practitioner in India knew nothing about the disease when it invaded Bombay. Warnings had indeed been issued by Colonel W. G. King, C.I.E., I.M.S., the energetic Sanitary Commissioner for Madras, to all Government medical officers in that Presidency to look for its importation from China, where it had broken out in epidemic form in the year 1894, but it is not matter for surprise that some time elapsed before the local medical faculty recognised the dread disease or realised its significance. Still less were they in a position to take prompt steps to stop it, or to advise correctly what the nature of these measures should be. Within a fortnight, however, of the recognition of the disease, the Government had sent Mr. Haffkine to Bombay from Calcutta, and had convened a committee of local medical men, with the professor of medicine in the Grant Medical College, Bombay, as president, to consider what should be done. I mention these facts merely as a mild protest against the recent assertions of certain writers in the medical and lay press, who appear to judge of the action, or inaction as they are pleased to term it, of the Government of India, by the light of knowledge acquired by ten years of laborious research carried out after this period.

One of the first things that our practical experience of plague in the Bombay hospitals revealed was, that there are two distinct types of plague—one, the pneumonic, which was very contagious; and the other, the bubonic and septicæmic, which was not communicated from one person to another. To our surprise we found that the attendants in hospitals and the friends of patients who accompanied their sick to the wards, did not take plague unless there happened to be a pneumonic case in the institution. In fact, so marked was this that Major Thomson, I.M.S., who had charge of the large hospital opened in the Old Government House at Parel, reported "that one of the safest places during the epidemic is the ward of a sanitary plague hospital, something more than mere contagion being necessary to develop the disease."[1]

Another fact that soon became apparent was the curious seasonal prevalence of the disease. It was found that each zone of country had an epidemic season of its own, each place having its epidemic at its own particular time and never at any other. Thus we find the epidemic in Bombay city takes place in the early months of the year, while at Poona, a town only 80 miles away, the disease does not appear till autumn, when Bombay is almost quite free. In other words, the plague appears in a place, increases in virulence and extent, declines and disappears on or about the same date annually, but the time of year varies with each locality.

As years passed and epidemic succeeded epidemic, facts came to light which pointed to huts or houses becoming infected with plague and remaining so even after the inhabitants had fled. Such rooms were found or suspected to be most dangerous at night. Over and over again cases of infection in health camps were traced to surreptitious visits paid to houses in infected villages, so that those responsible for the administration of these camps came to regard "dropping cases" of plague as proof of the inefficiency of their village cordons, for investigation generally led to the discovery of secret visits to the abandoned houses at night. Again, the occurrence of unexpected and heavy rain which compelled the people to abandon their flimsy huts and return to their houses, has often been followed by a virulent outburst of plague amongst them, though they had remained free from the epidemic whilst living in camp.[1] It was found even that houses might become infective while standing empty. When it became common for people to quit their houses because dead rats had appeared in them, instances came to light where a community had abandoned a village or quarter before plague appeared, and yet on their return after an interval of some weeks, a severe epidemic would break out, appearing simultaneously in several distinct quarters of the village. Evidently the houses had become infective during the absence of the owners.[2] The whole of the above evidence went to prove that man-to-man infection was not the cause of the spread of plague, but that we must look elsewhere for the active agent.

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[1] Gatacre, p. 52.

From the very earliest times it has been a common observation that rodents became affected in a peculiar way during the plague epidemics (*vide* 1 Samuel, chaps. v. and vi.), but it was not till Yersin and Kitasato announced the discovery of the *Bacillus pestis* in rats and mice in Hong-Kong in 1894, that it became certain that the disease in question was really plague. In India these observations were confirmed by Haffkine and Surveyor in October 1896, *i.e.* the very month in which plague was diagnosed with certainty in that country. Overwhelming evidence very soon came to light that rats spread plague in India.

It is impossible in the present paper to give more than a brief outline of the evidence in this direction. Those desiring further details are referred to the voluminous evidence given before the first Plague Commission, which, under the presidency of Sir Thomas Fraser, visited India in 1898–99, and published by them in five monumental Blue-books in 1901; or for additional and more recent instances to a paper by the present writer.[3]

It was early noticed that houses in close proximity became infective, though their inhabitants, owing to caste or other prejudice, could have had no communication with one another. Cases like the following could be multiplied.[4] A rat was seen by a Sikh family to come out of a hole in the wall, to wander about the room in an aimless sort of way, and shortly to die. A day or two after, plague breaks out in this house, and it is found on investigation that the rat hole leads into a neighbouring house where plague had occurred a day or two before. No communication could have taken place between these two families, for they belonged to castes that are abhorrent to one another. Again, two families are attacked in a Punjab village, one a Hindu, the other a Muhammedan family. The first case took place in the Muhammedan household, who lived in a courtyard just outside the village. To enter the Hindu's house it was necessary to traverse tortuous lanes leading apparently to the centre of the village, but on mounting to the flat roof it was found to be separated from the Mussalman's house by a small cowshed only. When the practice of unroofing houses for purposes of disinfection came into fashion, it was easy to trace the course of the disease through the villages by mounting to the roof and noting the lines of unroofed huts to be seen. These could be seen stretching in continuous lines through all the different quarters of the town, irrespective of the caste of their occupants.

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[1] Condon, p. 23.
[2] James, p. 97.
[3] "The Spread of Plague in India," *Journ. Hyg.*, Cambridge, 1906, vol. vi.
[4] James, p. 96.

These and similar examples irresistibly suggest the idea of spread by animals whose runs pass from house to house irrespective of caste or other prejudice, and the only animal that fills the rôle is the house rat of India.

Another fact that came to light as our experience accumulated was, that the epizootic precedes the epidemic. Examples of this are to be found in abundance in the volumes of the first Plague Commission Report, or in the annual reports of medical officers on plague duty; but as it is nowhere so clearly shown as in the chart for the city of Bombay for the year 1905–06, I refer to it here, though this was compiled by the second Plague Commission, and will be noticed in detail later on in this paper.[1] Suffice it to say, that dead rats are looked upon as the precursors of plague, and the rule, "When dead rats are seen, clear out or be inoculated," is now almost universally acted on throughout India.

All our Indian experience, then, points to the rat as responsible for the spread of plague, but is it wholly responsible?

That plague can in some way be communicated both to men and rats by infected clothes is a common belief in India. Instances, like the following related by Major Collie, I.M.S. (1898), are common. "A man lost his wife from plague in Bombay, and ten days later he brought her clothing and ornaments to his house in a village near Harnai in the Ratnagiri Collectorate. In about a week dead rats were found in this man's house and neighbourhood, when one relative after another sickened and died from plague, and ultimately the man himself became the sixth victim. None of his relatives had been out of their village." This was the first outbreak of plague in that part, and no other means of importation could be discovered. Again, it became a common practice in the Punjab for people to send away their best clothes to friends in distant villages, so as to avoid the necessity of disinfection which they feared might deteriorate them.[1] In this way many infections of outlying villages are believed to have been brought about. It did not necessarily follow that the person bringing the clothes took the plague, for more often perhaps the disease first appears among the rats in the vicinity, and only afterwards among the inhabitants. After an experience of five epidemics in the Punjab,[2] we find it reported that the sweepers of the Ambala district consented to the burning of all the clothes of persons dying of plague, instead of taking them away as perquisites, as had formerly been the custom. In Patiala State these menials refused to touch either bedding or clothing of plague patients, which in consequence had to be burned where they lay. Major Wilkinson, I.M.S., also reports[3] that "several instances were observed where thieves who had stolen infected clothing and taken it away to their own villages, died there of the disease."

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[1] *Vide* p. 443, *infra.*

To sum up, then, we may say that Indian experience leads to the following conclusion. As regards introduction into a new area remote from a focus of disease, human beings are the carriers of infection, and every one agrees with the dictum of the Collector of Thana, who said regarding this matter, that "plague adhered to the railway, and it almost confined itself to the area traversed by the local trains. Given accommodation for high-caste natives, and easy distance from Bombay, infection was everywhere a certainty."[4] Within towns and villages, however, the case is far otherwise, for here the universal testimony is that rats are the means of the dissemination of plague.

The question then naturally arose, How does plague spread from rat to rat and from rat to man, and how can clothes be a means of carrying the disease from one place to another? The possibility of insects playing some part in the matter, of course, occurred to many. If, as the first Plague Commission believed, infection is always conveyed through the skin, it is evident that *biting* insects must be the criminals. In India, Simond of the Pasteur Institute was the first to suggest the flea as the carrier of the disease. He made a few experiments on this point, and was able in two instances to infect a rat kept in a glass case along with another rat sick of plague, actual contact being carefully avoided. He maintained that this theory explained much that was puzzling in the epidemiology of the disease, and hazarded the opinion that the actual mode of infection was from the fæces of the insect, which he noted were discharged upon the skin while the flea was sucking, and might easily be rubbed into the flea-bite in the process of scratching. The first Plague Commission, however, adversely criticised his work, and considered his process of induction "so weak as to be hardly deserving of consideration."

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[1] James, p. 89. [2] Wilkinson, 1904, *a*, p. 29. [3] 1904, *b*, p. 17.

[4] "Report of Sanitary Commissioner" with Government of India for 1897, p. 190.

They further conclude from the experience of plague hospitals in India, "that suctorial insects do not come under consideration in connection with the spread of plague."[1] When we consider the authoritative character of the first Plague Commission and the eminent scientists who made up its personnel, it is little wonder that such expressions should divert the attention of workers in India from the view that fleas could have anything to do with the spread of plague. All the more honour, then, to my friend and colleague, Captain Glen Liston, I.M.S., himself one of the assistants to that Commission, for having seen the possibilities that this theory held out, and who diligently collected facts, and, in spite of frequent discouragement and non-success, conducted experiments in the laboratory, which, by the time the second Plague Commission arrived, had placed the despised hypothesis in quite a new light, leading them to adopt it as that most likely to lead to success. He began by studying the species of rats met with in Bombay, and the ecto-parasites infesting them. He found that there were two species of rats common in Bombay, both of which suffered from plague to much the same extent.

FIG. 2.—*M. decumanus.*

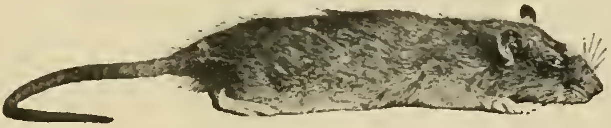


FIG. 3.—*N. bengalensis.*

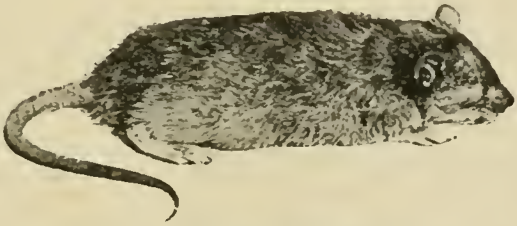
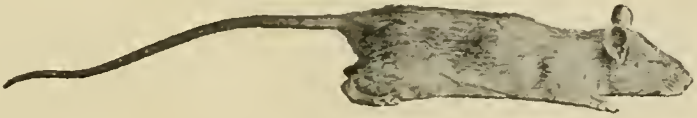


FIG. 1.—*M. rattus.*



From photographs by C. R. Avari. Fig. 1 is unfortunately on a smaller scale than the others.

The one (*Mus rattus*) is identical with the black rat of England, which has become quite rare in Britain, as it has been overpowered and driven out by an invasion of the brown Norway rat (*M. decumanus*), which, perhaps luckily for us, has become the common rat here. It is easily distinguished by its long, ringed, dark-coloured tail, which is *longer than the head and body together.* Its ears are large and elegant. The colour is very variable, the commonest shade in Bombay being brown, but all grades between that and black are found. The belly is invariably of a lighter shade, and when this is very marked the animal has by some been classed as a variety under the name of *M. alexandrinus.* This rat, by consorting for centuries with man, has become almost a domestic animal in India, and takes the place occupied by the cat in our houses, living as it does in every room, and even breeding there among the neglected rubbish, or in drawers and cupboards seldom opened. Being a most nimble climber, it lives largely in roofs and shelves, though it is capable of burrowing in earthen floors in grain stores and the like. It is largely a grain-feeder, and its nests are to be looked for in stacks of firewood, old bedding, or other accumulations of rubbish. To an animal of such habits, an Indian village, with its mud and thatched roofs to nestle in, and its stores of grain to feed on, must offer every attraction, and we need not be surprised to hear of 200 and more being found dead in a single house.

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[1] Vol. v. p. 77.

The other common rat of Bombay (*M. decumanus*), the brown or Norway rat, has the *tail shorter than the head and body together*, and its ventral aspect is of a lighter shade of colour than the dorsal. The ears are smaller than in *M. rattus,* and the nose might almost be called Roman. The colour of the fur is brownish-grey, and much more constant than in *M. rattus.* It is not indigenous in India, but is now found in all seaports, having no doubt been introduced by shipping. It is not strictly speaking a house rat, though its extensive burrows are found at times in the lime-concrete flooring of the ground, and even of the first storey of the Bombay city houses. It delights mainly in municipal dust-bins and the garbage in the surface drains of the narrow gullies to be found between every block of houses in Bombay. It breeds in the extensive burrows it makes under the ground floors of houses and stores, and is to be found in thousands in the empty rain-water drains of an oriental town as well as in their badly laid sewers. It will be noted that there is an essential difference in the habits of the two species of rats, the one living with the people in their houses, the other apart from them in the gullies and sewers or in the open ground round the houses. There is a common meeting ground, however, for the two species in the ground floors of houses and stores; and as it is known that *M. decumanus* develops plague before *M. rattus*, and appears to be more severely affected by it, the importance of remembering this is obvious. It is plain from the above account of their habits that man is much more likely to take plague from *M. rattus*, with which he is brought into intimate relation, than from *M. decumanus,* which lives apart from him.

Some time after the Commission had begun work, Dr. Hossack, who was on plague duty in Calcutta, published a paper calling attention to the fact that most of the rats caught in that city belonged to a third species of rodent, *Nesokia bengalensis.* It was then recognised by the Commission that a few of the rats caught in Bombay also belonged to this species, but as they amounted to 3·2 per cent. only of the decumanus-like rodents, they may for practical purposes be neglected. This small bandicoot rat may, like *M. decumanus*, be distinguished from *M. rattus* by having the *tail shorter than head and body together.* The tail has well-marked rings like that of *M. rattus*, but it has not the brush of hairs projecting beyond the tip as *M. decumanus* has. The head is broader and shorter, and the ears larger than *M. decumanus.* The fur is dark and coarse, and numerous bristles are present on the back. Nesokia grunts like a pig when alarmed, whereas the other rats squeal.

In the course of his study of the rats of Bombay, Captain Liston likewise discovered that the fleas of rats belonged to a different species from those of man. He sent specimens to the Hon. N. Charles Rothschild, the greatest living authority on the Siphonaptera, who identified them as *Pulex cheopis*, a flea first found by him in Egypt (hence the name), but since ascertained to be the commonest rat-flea in all parts of the world, with the exception of Northern and Central Europe, where it only occurs rarely on ship rats. It is the common flea of rats in India, and is found on all the rats there of whatever species. Liston likewise found that, in the absence of rats this flea would take to other animals and even to man. Thus in March 1903 the guinea-pigs at the Zoological Gardens at Bombay were attacked by plague, and on investigating the matter Liston found that the animals, and especially those that were sick, were infested with fleas, though, as a rule, none are to be found on them. Dead rats had been picked up near the guinea-pig cages, and so he concluded that the rat-fleas, having no rats to feed on, had attacked the guinea-pigs, and thus infected them with plague. He therefore hit on the happy idea of using guinea-pigs for trapping fleas in plague-infected places, and in this way was able to prove their presence in huts from which plague patients had been removed.

On dissection these fleas were found to have their stomachs full of plague germs in an apparently living and healthy condition, in no way adversely acted on by the juices of that organ. He likewise found that a certain proportion of the guinea-pigs exposed to the bites of these fleas developed plague and died of it. Guinea-pigs exposed in neighbouring huts which were not plague infected had no fleas on them, nor did they die of plague. He likewise proved by actual observation that *P. cheopis* will attack man when its natural host is absent. For instance, he relates that rats began to die in a crowded tenement or "chawl," then they disappeared, and the inhabitants were so troubled with the attacks of fleas that they had to sleep in the verandahs. A few days later two of them developed plague, and on collecting fleas from the others, it was found that out of thirty caught, no less than fourteen were rat-fleas. These observations of Liston's seem to me to amount very nearly to incontrovertible proof that plague can be conveyed by fleas from one animal to another, and that the rat-flea will attack man, and therefore may transfer it to him also.

Such was the state of our knowledge in India early in 1905, and so important to us in the laboratory did the flea hypothesis appear, when viewed from this new standpoint, that Captain Liston and I designed, and obtained permission from the Bombay Government to build, a set of experimental godowns or cabins, in which to carry on a series of experiments in circumstances as nearly approaching those found in the native town as possible. These godowns were complete before the Plague Commission arrived, and it was only because we had to await the necessary drying of the walls that experiments had not already been begun before they were handed over to that body. When the Commission's experiments are described, it will be seen how important a part they played in the proof of the infectivity of the rat-flea.

The godowns are six in number, and built as a row of "lean-to's" against an existing wall. The walls, of brick and mortar, are 9 inches thick, and the floors are of concrete on a high plinth. The floor space measures 7 by 6 ft., but an inspection chamber inside the door, measuring 3 ft. square, has to be deducted, thus leaving only 33 square ft. available for the experimental animals. The front walls measured 7½ ft., and the back walls 9 ft. in height. The roofs were lined inside, below the tiles, with wire-netting, so as to prevent the entry of wild rats through the tiles.

The inspection chambers also were shut off from the interior space where the animals were kept, by similar wire-netting, so that one could open the door, and, standing in the chamber, watch what was going on inside, without the danger of letting any of the infected animals escape. The six godowns were in all the above respects exactly alike, except that Nos. 5 and 6 had windows in the walls to permit of ventilation, but closed by a double layer of wire-netting carried on a wooden framework. The essential difference is in the structure of the roofs. Nos. 1 and 2 were covered with the ordinary country tiles, laid on wooden laths, such as one finds everywhere in India. The tiles are made by the potter in the shape of cylinders, which are divided lengthways before being fired. They are laid in four layers on the laths, the lowest layer with the half cylinder facing up, the second facing down so as to cover the edges of these; and so again with the two most superficial layers. It is evident that such an arrangement admits of easy dislodgment by rats and crows, and is in no sense a rat-proof roof. Godowns Nos. 3 and 4 were roofed with flat pan tiles, made in Mangalore, and known universally as "Mangalore tiles." These do not admit rats so readily as the country tiles, but yet are by no means "rat-proof." Godowns Nos. 5 and 6 were covered with corrugated iron sheeting, carefully cemented down to the top of the walls, to make these godowns rat-proof. As this did not, however, prove effective against fleas, a reinforced concrete roof was substituted. The only other difference between the godowns was that No. 1 had a glass skylight, and No. 3 a ventilator which admitted a certain amount of light to the interior, whereas the others were nearly dark. By this arrangement we were able to carry out experiments under various conditions, and it was found that the number of fleas in each godown varied with the accessibility of the roof to rats and the amount of light in the interior.

With all this evidence before them, the Plague Commission decided that rats were responsible for the spread of plague in India, and therefore set themselves to find out how this took place.

Three possibilities presented themselves for their consideration, namely—(*a*) Rats might soil the food by their excreta; (*b*) rats might similarly contaminate the floors; (*c*) some insect on the rats might convey the bacillus.

Let us see what conclusions they arrived at as to these three alternatives.

(*a*) That infected food might be the means by which plague is conveyed from one being to another, was a favourite hypothesis in the early days of plague, and gave rise to much vexatious legislation.

The first Plague Commission concluded that though it was possible to produce plague by feeding, yet this method was probably not a common one in nature. The German Plague Commission thought that rats generally became infected in this way in nature. The Austrian Plague Commission succeeded in infecting rats through the mouth, but never saw any post-mortem appearances pointing to primary infection through the stomach, unless a stomach tube was used, or a large amount of material was administered. Other observers on the Continent and elsewhere, including Klein in London, have succeeded by various methods in infecting rats by feeding with cultures or the bodies of animals dead of plague.

It therefore became important to reinvestigate this question. The Commission accordingly undertook three series of experiments, using the ordinary wild rats of Bombay; rats from ships in the harbour; and rats found in the Punjab villages. These were fed in the same manner with the internal organs of rats or guinea-pigs dead from acute plague, mixed with the ordinary food of the rats. The Bombay rats were each fed once on from one-sixth to one-tenth of such internal organs, while the Punjab ones got slightly more. A fourth series of experiments was carried out to get over any objection that might be raised from the absence of bone in the food given to the first three sets of animals, by giving the carcases of dead plague rats to Bombay rats which had been starved for twenty-four hours. A rigorous post-mortem examination of all rats dying was of course made, and those left alive at the end of three weeks were killed and similarly examined.

The result is set forth in the following table:—

Series.	No.	Number dead of Plague in Twenty-one Days.	Number Plague-infected when killed on Twenty-first Day.	Percentage Plague-infected.
1. Bombay rats . .	415	83	6	21·4
2. Ship ,, . .	41	17	1	43·9
3. Punjab ,, . .	28	19	0	67·9
4. Bombay rats fed on carcases . .	108	36	5	38·0
Total . .	592	155	12	26·2

Note that the ship rats were twice as susceptible as the wild rats of Bombay city, also that the Punjab rats were three times as susceptible. This latter fact is probably to be explained by the larger dose of infected material given, for they also all died within five days of feeding, which implies a more virulent disease. From these experiments the Commission arrived at the conclusion that it was possible to infect rats by feeding, *if the dose of infecting material was large*, much larger in fact than would be likely to be met with in nature. That rats do not become thus infected in nature they considered proved by two considerations, namely—the different site of the primary bubo in naturally infected rats and in those infected by feeding as above; and the pathological changes to be found in the stomach and intestines.

In 6000 post-mortem examinations of rats naturally infected with plague, they found the primary bubo to be situated in the neck in 74 per cent., and in the inguinal region in 25 per cent. of the animals, and in no single case were mesenteric buboes present. On the contrary, in the case of the 155 rats infected by feeding, the mesenteric glands were affected in 73 per cent., the neck glands in 35 per cent., and the inguinal glands in one case only.

Again, in naturally infected rats the stomach and intestines show, as a rule, no marked pathological change, whereas in the case of those infected by copious feeding, well-marked lesions are to be found there.

The large number of times that negative feeding experiments with grain soaked in plague culture have been made in India by Gibson and others,[1] proves that contamination of food-stuffs, such as might conceivably occur in nature by dropping of plague-infected excreta, would not prove dangerous; but to confirm or disprove this, a number of investigations were made as to the infectivity of the urine and fæces of plague patients and rats.

Comparative examinations were made of the numbers of bacilli to be found in the blood and urine of rats dying of plague, by taking blood from the heart and urine from the bladder simultaneously, and estimating the actual numbers of bacilli in a cubic centimetre of each. In twenty-one cases where this was done, two showed bacilli neither in the blood or urine; in thirteen no bacilli were found in the urine though present in the blood. In one instance where the blood contained from 10 to 100 million plague bacilli per c.c., less than 10 per c.c. were present in the urine, and in cases not so extreme as this the number in the urine was always from 100 to 1 million-times less than in the blood.

To ascertain whether urine containing plague germs was a means of spreading plague among rats, a large number were fed with the urine of human plague cases, of so acute a nature that 88·5 per cent. of them terminated fatally. Of the thirty-five cases, the urine of which was used, nineteen had bacilli in the peripheral blood as ascertained by culture. In all, 194 rats were fed once on such urine, from 2 to 3 c.c. being mixed with the parched maize on which the rats are ordinarily fed. Not one of them developed plague.

That the urine had live plague bacilli in it, is proved by the fact that guinea-pigs injected with it subcutaneously, died of plague in many instances; seven out of the thirteen urines being thus proved infective. It is quite clear then that much greater contamination of food than could ever conceivably occur in nature would be required before plague could be spread in this manner.

As regards the chance of fæcal contamination of food giving rise to plague in rats, the following experiments were carried out. Rats in whose blood abundant plague bacilli were found were used to furnish the material. After death the abdomen was opened, and with the usual minute precautions to avoid contamination of the fæces with blood or peritoneal fluid, the anterior wall of the rectum was divided, and a small portion of the contained fæcal matter removed. This was emulsified with a small quantity of sterile broth, and the thick emulsion resulting rubbed into the shaved and scarified surface of the abdomen of fresh rats. In this way 139 rats were inoculated, but as of these thirty-six died of some other disease, only 103 were observed throughout. Of these only three died of plague, giving a mortality rate of 2·9 per cent. for this method of experiment. This method of inoculation by rubbing infective material on to the abraded abdominal surface is, I may explain, extensively used by us in the laboratory, for the diagnosis of plague in putrid carcases, where the microscope and culture methods fail. From extensive experiments made by the Commission to test the reliability of this method, they concluded that "it would appear to fail only in about 2 per cent. of fresh, and about 10 per cent. of putrid rats."[1] We may safely conclude, then, that had it been possible for rats in natural conditions to be infected by the bacilli in the fæces, a larger number than three out of 103 would have developed the disease.

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[1] Plague Commission Report, vol. v. p. 74.

If, then, rats cannot be infected by the sure and effective method of skin inoculation, it is reasonable surely to argue that they would still less be likely to acquire plague by eating the excreta of their plague-stricken companions. And this is of course confirmed by the fact that one never finds mesenteric buboes in rats infected by plague in a natural way.

Again, as will be more fully explained later on, experiments on a large scale were carried out in a flea-proof godown, in which large numbers of guinea-pigs were confined, in circumstances of overcrowding and bad sanitation. The godowns were never cleaned out, so that at the end of a week the animals in them were running about on a floor which resembled nothing so much as a dunghill. Those who have watched guinea-pigs feeding know how greedily they feed, not hesitating to climb into the feeding troughs, so that the food soon becomes defiled with both solid and liquid excrement. Yet 150 guinea-pigs were kept under these conditions for six weeks at a time, and not one ever contracted plague, and this though at times there were introduced among them nearly their own number of infected ones. It is certain that the healthy animals must have eaten quantities of food defiled by their plague-stricken companions, yet as long as fleas were excluded none of them developed plague.

Again, it has been a common observation in the Indian plague hospitals that infants do not contract plague though suckled by plague-stricken mothers, and the same thing is seen among guinea-pigs in flea-proof godowns such as the above.

With regard to plague in India we can say with perfect confidence, in conclusion, that food contaminated with plague material has nothing whatever to do with the spread of the disease.

It may be well, however, to call attention to the observations of Hunter in Hong-Kong, who maintains that rats scatter broadcast, by means of their excreta, millions of plague bacilli, that they thus contaminate the food of the people, and that man is infected, in the majority of cases, by the intestines. He minimises the danger of skin infection, and considers that plague-infected fleas are of no importance, and that insects act merely as passive carriers of the bacilli. He considers buboes secondary to the blood infection. He is supported in these contentions by Simpson, who says: "The facility with which the lower animals contract plague by feeding, is in favour of man contracting it often in the same way." It may be remarked here that though Simpson was able to infect all the domestic animals of China, with the exception of the dog, by feeding them on huge quantities of plague-infected viscera, yet the same experiments carried out by myself in Bombay, and by Hill and Pitchford in Natal, proved uniformly negative. Further, the Austrian Plague Commission, who devoted most of their time in Bombay to the investigation of the pathology of human plague, came to the conclusion that in an overwhelming majority of cases infection takes place through the skin; that a primary blood infection does not take place, as the bacilli are in the first instance taken up by the glands, and only secondarily invade the blood stream; that infection may also gain entrance through the mucous membrane of the mouth, nose, throat, the tonsils and conjunctivæ; and that in no single instance did anything point to a primary intestinal infection.

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[1] *Journ. Hyg.*, Cambridge, vol. vii. p. 358.

It would appear almost as though there were some curious difference in plague in India and in China; for the above views seem incompatible otherwise.

(*b*) We may now turn to the second supposition, and see whether there is ground for believing that plague is spread through contamination of the soil. This has been a favourite theory with many authorities, and one can easily understand this when the habits of the natives of India are considered. They go barefoot in most cases, even the wealthy taking off their shoes on entering the house. They likewise often eat their food from leaves placed on the floor, and it must, in consequence, often be exposed to contamination from the soil, even after it is cooked. From the time when Yersin described a bacillus recovered from the soil of a plague hut in China, which he considered as an a-virulent form of the plague germ, many have tried to find it in similar situations, but in vain.

Thus in India, Hankin, Gibson, Leumann, Liston, and others have repeatedly examined soil without being able to find the plague bacillus. In one or two instances where it was isolated, the observers attributed their success to recent contamination of the floor with pneumonic sputum.[1]

Gibson in a series of experiments carried out in the Plague Research Laboratory, proved that rats injected with an emulsion of soil to which a minute quantity of plague bacilli had been added, almost invariably died of plague, but that if soil from an infected locality alone were used they died of some other disease. Recent researches by cultural and inoculation methods carried out at my suggestion in the same laboratory by Mackie and Winter, with artificially infected unsterilised floor soil, show that plague bacilli rapidly perish in the presence of saprophytic organisms, and have completely disappeared after four days. The Plague Commission's experiments in this connection were made in a small godown, roofed with country tiles, and in every way similar to hundreds of dwelling-houses in Bombay. The floor was the usual one of rammed earth covered with a plastering of cow-dung. A second series of experiments was made in a similar room in which the floor was of lime concrete. These floors were grossly contaminated by flooding them with a virulent broth culture of plague bacilli, and from these floors scrapings were taken at intervals of twenty-four hours and rubbed into the scarified abdominal surfaces of rats and guinea-pigs. The contamination of the floors was, of course, very greatly in excess of anything that could conceivably take place in natural circumstances, and the manner of infecting the experimental animals was likewise calculated to be much more likely to give them plague than a natural infection would be. Yet the Commission declare that a cow-dung floor "can retain its infectivity for forty-eight hours but no longer, and that a chunam floor, treated in the same way, does not remain infective even for twenty-four hours."

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[1] Vide *Journ. Hyg.*, Cambridge, vol. vi. p. 199.

Another series of experiments was made with animals penned on the contaminated floors and running freely about on them. Under these circumstances, which more nearly resemble the conditions in which human beings live, except in that the floors were so grossly contaminated, it was found that cow-dung floors remained infective for twelve, but not for twenty-four hours after contamination, while the concrete ones kept their infectivity for six, but not for twelve hours. In these experiments only a very small percentage of the animals exposed to infection contracted the disease, and then only when the floors had actual pools of liquid on them when the animals were turned on.

Again, as we shall see, animals may contract plague when carefully protected from contact with the soil.

Lastly, we may refer to the fact, which will be dwelt on in a subsequent part of this paper, that just as many guinea-pigs contracted plague in disinfected rooms in Bombay city as in rooms not so treated. The disinfectant was a well-made acid solution of perchloride of mercury, of the strength of 1 in 750, which was abundantly proved to be capable of sterilising the soil of the rooms. Thus all chance of infection from germs in the floors was removed, and yet this did not prevent the animals running about in these rooms from contracting plague from another source. Needless to say, there were present rat-fleas, which are not inconvenienced by the perchloride of mercury.

It will be seen, then, that neither in contaminated food nor soil could the Plague Commission find any solution of the problem of the spread of plague in India.

(*c*) Let us turn now to the last possibility, namely—that some parasite of the rat might be the sought-for agent.

It soon became evident that the only biting insect that need be considered was the rat-flea (*P. cheopis*), which, as we have seen, is the common rat-flea all over the world, except in Northern and Central Europe.

As it is important to be able to distinguish one flea from another, the following simple description, taken from the Report of the Plague Commission, is quoted as quite sufficient for the purpose; those wishing fuller information are referred to the paper itself.

"These other species of flea are—(1) *P. irritans*, the human flea; (2) *Ceratophyllus fasciatus*, the flea commonly found on rats in Europe; (3) *P. felis*, the cat and dog flea; (4) *Ctenopsylla musculi*, commonly found on mice and rats in various parts of the world; (5) *Sarcopsylla gallinacea*, a flea commonly found on birds.

"All the above-mentioned fleas have at one time or another been met with on rats. They all have well-developed eyes, except *Ctenopsylla musculi*. Of the remainder, *Ceratophyllus fasciatus* and *P. felis* have a prothoracic comb of bristles, and the latter a perioral comb. These bristles are absent in *P. cheopis*, *P. irritans*, and in *Sarcopsylla gallinacea*, but the latter flea is readily distinguished from the other two by its angular-shaped head, and its largely developed mandibles.

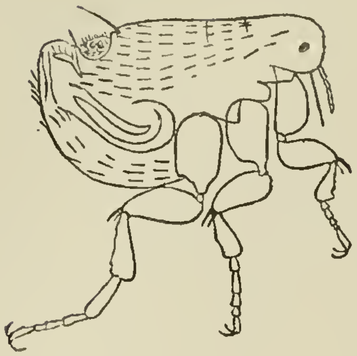
"We are thus left with *P. cheopis* and *P. irritans*, which can be differentiated from one another as follows:—

"1. *P. cheopis* is small and light-coloured when compared with *P. irritans*.

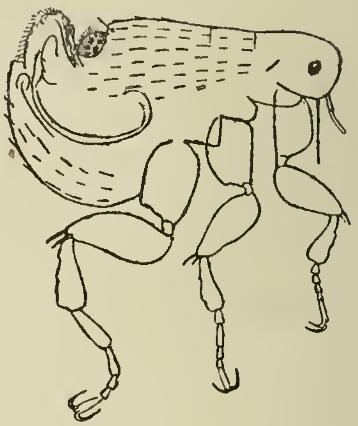
"2. The number of bristles on the head is greater in *P. cheopis* than in *P. irritans*, *i.e.* there is only one bristle on the posterior portion of the head in *P. irritans*, namely, the one which is found at the posterior and inferior angle of the head, and corresponds in situation to the bristle which is common to the two rows of bristles found in this posterior portion of the head of *P. cheopis*. Moreover, the ocular bristle in *P. cheopis* is situated nearly on a level with the upper border of the eye, while in *P. irritans* it arises nearer to the lower margin of the eye.

"3. The antipygidial bristles in *P. cheopis* are longer than those found in *P. irritans*.

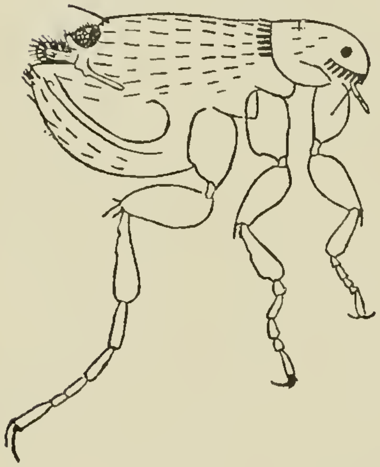
"4. In the female *P. cheopis* the antipygidial bristle is longer than the pyramidal bristle of the ninth tergite, while in *P. irritans* the pyramidal bristle of the ninth tergite is as long as, if not longer than, the antipygidial bristle.



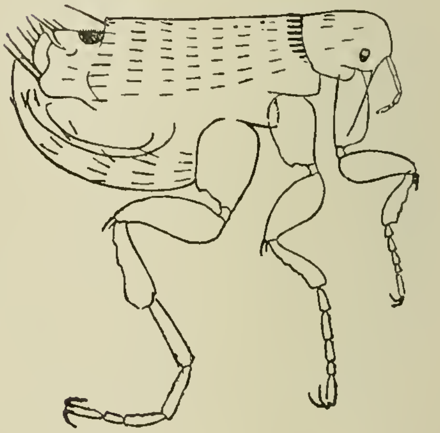
♂ Pulex cheopis



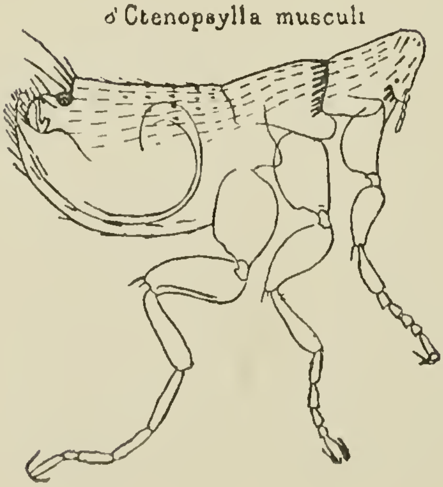
♂ Pulex irritans



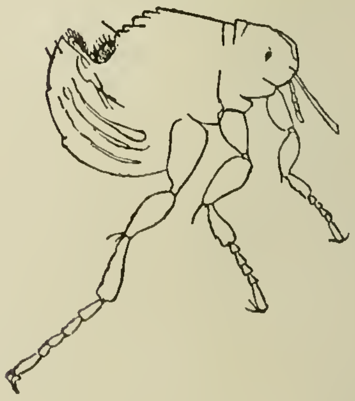
♂ Pulex felis



♂ Ceratophyllus fasciatus



♂ Ctenopsylla musculi



♂ Sarcopsylla gallinacea

"5. In the case of males the shape of the clasper at once distinguishes the fleas from one another.

"6. The shape and size of the claws are different in the two species. They are small in *P. cheopis* and large in *P. irritans*."[1]

The first step taken was to find out whether it was possible to transmit plague from rat to rat by means of these fleas. The first set of successful experiments was made in the following manner:—

A glass box was made large enough to contain a couple of wire cages, in which rats or other small animals might be confined. Each cage was placed on a separate tin tray, filled with sand to absorb urine and to afford shelter to the fleas, and was separated from the adjoining cage by a few inches of space. The tops of the cages were made of tin, and rose an inch or two above the sides of the glass box in which they stood, and had lids through which food and water could be introduced, and the animal withdrawn when necessary. The whole apparatus was covered and made insect-proof by fine muslin stretched from the sides of the glass box to the tin necks of the cages, and carefully secured with glue. The experimental animals in the wire cages were therefore protected from the visitation of insects from outside, and any insects placed in the glass box were unable to escape, though they had free access to the cages through the wire-netting of which the lower parts were made. Each cage being placed in a separate tray ensured that the excretions of one did not get into the cage of the other,—in fact, the experimental animals were living in absolute isolation, though in close proximity to one another; the only possible communication being through the air, or by means of some insect capable of passing from one cage to the other. The mode of procedure was as follows:—

Into one of the cages was put a rat infected with plague artificially, and along with it ten to twenty rat-fleas. As soon as this rat died a healthy one was placed in the other cage in the same glass box. The dead rat was left beside it in the first cage for from eight to twelve hours, when it was removed and examined to make sure it had died of septicæmic plague, for if no bacilli could be found in the blood, it is manifest that the fleas could not infect themselves by sucking. If the healthy rat died subsequently, the usual bacteriological examination was made to make sure it had died of plague. After the necessary practice had rendered the method workable, the experiment was made with white rats imported from England, and therefore not under suspicion of being partly immunised by exposure to previous plague-infection. In eleven out of sixteen experiments, *i.e.* 69 per cent., the healthy rat contracted plague. The same procedure was then followed, using ordinary Bombay rats, which had been carefully segregated, to make sure they might not be in the incubation stage of plague. In fifty complete experiments it was found that in nineteen cases, *i.e.* 38 per cent., the healthy rat developed plague. Taking into account that a fairly large percentage of Bombay rats are immune to small doses of plague, these two results are very similar. We find, then, that on thirty occasions a healthy rat contracted plague from a plague-infected one in its vicinity in circumstances where the only means of communication was either "aerial contagia" or rat-fleas.

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[1] *Journ. Hyg.*, Cambridge, vol. vii. p. 455.

To exclude the possibility of aerial infection, another series of trials was made by putting fleas from plague rats into a glass box similar to the above, but containing only one cage with a healthy rat in it. In eight out of thirteen complete experiments made with English white rats the flea-bitten rat died of plague, a proportion of 61 per cent.

When Bombay rats were used, thirteen out of twenty-five contracted plague, a percentage of 40. To sum up, we find that in twenty-one out of thirty-eight trials healthy rats in flea-proof cages contracted plague in consequence of living with rat-fleas collected from rats in another cage, dead or dying of septicæmic plague; thus demonstrating directly that the rat-flea is capable of carrying plague from one rat to another. Many hundreds of successful flea-transmission experiments were subsequently carried out with guinea-pigs in the above manner, and likewise by confining fleas from plague-infected rats in test tubes, and allowing them to feed on definite areas of skin of healthy animals through a layer of muslin stretched over the mouth of the tube.

Having proved that it is an easy matter to infect susceptible animals by means of rat-fleas taken from plague-infected animals, the next step was to find out whether close contact of one animal with another was, in the absence of fleas, capable of starting an epizootic among them. For this purpose the godowns already described were utilised. It is necessary to recall the fact that the essential difference in these six godowns or cabins consisted in the structure of the roofs, which gave more or less free entrance to, or excluded rats; and that the number of fleas to be found in each godown varied with the accessibility of the roof to rats, and the amount of light in the interior.

The first experiment was made in godown No. 6, one of the flea-proof godowns, in the end of May 1905.

Fifty healthy and flea-free guinea-pigs and ten others inoculated with a virulent culture of plague germs were placed together in the godown, which purposely was never cleaned out, so that in a few days the interior became highly insanitary. The food, consisting of green grass and bran, was placed on the floor, and of course became contaminated by the excretions of the plague-infected animals. All the ten inoculated guinea-pigs died of plague, with the exception of one which had been cutaneously inoculated, yet not one of the fifty healthy animals developed the disease, though they were kept under observation for seven weeks before being removed from the godown. Many other similar experiments were performed in the following years, both during the epidemic and non-epidemic seasons, and invariably with the same results, provided fleas were rigorously excluded. Thus in six contact experiments made in 1906–07 we find that "not a single healthy guinea-pig died of plague." In some of these experiments plague-infected guinea-pigs were added daily for from fourteen to twenty-one days, so that the intensity of the infection was well kept up. On one occasion it is recorded that "there were twenty-one plague-infected animals in contact with the twenty-five uninoculated guinea-pigs. These latter, however, remained healthy until the experiment was abandoned on 21st November 1907. No fleas were observed on the guinea-pigs throughout the course of the experiment."[1]

A parallel series of experiments in the godowns which received a regular supply of fleas from the roofs was carried out at the same time. An example may be cited from one carried out in the epizootic season. On the 8th January 1907 five plague-infected guinea-pigs were placed in godown No. 2, and in three days they had all died of plague. On the 11th January, after the last of the dead bodies had been removed, twenty-five healthy guinea-pigs were introduced and allowed to run free in the godown. An epizootic of plague at once broke out amongst them, and all had succumbed in a fortnight. Fleas were present in great numbers throughout this experiment. Similar experiments, made during the off season, resulted in the death of at most one or two guinea-pigs, and in many cases none of the healthy animals were affected at all.

At the end of one of these experiments an examination of the bodies of the last victims revealed the presence of innumerable fleas. Of these 115 were transferred to godown No. 5, where for three weeks forty-nine guinea-pigs had been living in the insanitary conditions described above, yet without any ill effects. Next day 106 more fleas were added. In four days thereafter one guinea-pig was dead from plague, and in six weeks all had succumbed to that disease.

Still further experiments were performed in the flea-infested godown by separating the guinea-pigs in it into three groups; one allowed to run about on the floor, another confined in cages suspended 2 in. above the floor, and a third in cages 2 ft. from the floor. It had been ascertained that the jump of a flea is less than 6 in., therefore it is evident that the animals in the first two groups were accessible to the visits of fleas, while the animals in the cage hung 2 ft. above the floor were not.

There were four guinea-pigs in each group. Two days after being placed in the godowns they were removed and examined for fleas under chloroform. "One hundred and twenty-five fleas were taken on the guinea-pigs" from the floor, twenty-seven from those in the cages hung 2 in. from the floor, and none on those in the higher cages. The eight animals composing the first two groups were evidently ill and had buboes on the neck. The four from the high cages were quite well. It only remains to say that all the animals in the first two groups died of plague, while the four in the cages beyond the reach of fleas remained healthy.

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[1] *Journ. Hyg.*, Cambridge, vol. vii. p. 426.

Monkeys, as more nearly resembling man, were used on several occasions in these experiments, being left in the godowns for forty-eight hours. The result of these experiments was that not one of eleven animals protected from fleas contracted plague; while six out of thirteen unprotected developed the disease.

It will be convenient at this point to contrast in tabular form the positions of the buboes in rats infected by feeding, by fleas, and as found in nature, and we shall find remarkable support in this way for the theory that the rats found dead during an epizootic have contracted plague by being bitten by infected fleas.

	Naturally Infected.	Infected by Fleas.	Infected by Feeding.
Rats examined . .	5188	117	155
Rats without buboes .	16 per cent.	18 per cent.	8 per cent.
Cervical bubo . .	72 ,,	61 ,,	35·0 ,,
Axillary ,, . .	23 ,,	22 ,,	0·7 ,,
Inguinal ,, . .	18 ,,	35 ,,	0·7 ,,
Mesenteric ,, . .	0 ,,	0 ,,	73·0 ,,

The remarkable similarity in the percentages of the first two sets of animals points undoubtedly to a common source and channel of infection; the source being the flea and the channel being the skin. While, on the other hand, the difference in these proportions produced by a new method of infection, and the appearance of buboes in a new site altogether, point as conclusively to this new method not being the one found in nature.

I cannot do better than sum up here in the words of Major Lamb, the senior member of the Commission, who writes:[1]

"(*a*) Close and continuous contact of plague-infected animals with healthy animals, if fleas be excluded, does not give rise to an epizootic among the healthy animals. As the godowns were never cleaned out, close contact includes contact with fæces and urine of infected animals. Close contact, even the suckling of young by plague-infected mothers, does not give rise to the disease.

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[1] "Etiology," p. 41.

"(*b*) When fleas are present, the epizootic, if it does start, varies in severity and rate of progress according to the season of the year and the number of fleas present. The season in which epizootics are readily produced experimentally and spread rapidly, corresponds with that of the plague epidemic.

"(*c*) An epizootic of plague can occur in a godown containing infected fleas without direct contact of healthy animals and infected animals.

"(*d*) In an infected godown the infection is effective in proportion as the test animals are accessible to fleas.

"(*e*) Infection can take place without any contact with contaminated soil.

"(*f*) Aerial infection is excluded.

"(*g*) The experiments lead to the conclusion that fleas and fleas alone were the transmitting agents of infection."

Having definitely shown that plague infection can be conveyed from one animal to another by means of the rat-flea, experiments were made to prove that plague-infected houses are dangerous because of the fleas they contain. For this purpose houses were chosen, in which two or more cases of plague had occurred, or in which plague-infected rats had been found; that is, care was taken to be reasonably sure that the room experimented with was really plague-infected.

The method employed was that devised by Captain Liston, where guinea-pigs were allowed to run free in the rooms for from about eighteen to forty-eight hours. The guinea-pigs were then caught and chloroformed in a bottle, when it was easy to collect and count the stupefied fleas. The first fact discovered in this way was that nearly all the fleas caught in plague-infected rooms were rat-fleas, and that they were present in large numbers. The second fact discovered was that a large number of the guinea-pigs thus allowed to run free in these rooms developed plague. Thus out of a total of 189 houses experimented with in Bombay and the Punjab, forty, or 21 per cent., proved infective to guinea-pigs.

A similar set of experiments made in rooms which had been first disinfected by the Bombay Health Department, is highly instructive. The disinfection was performed by thoroughly washing floors and walls with an acid solution of perchloride of mercury of a strength of 1 in 750, which had been proved capable of killing plague germs in cow-dung floors. A few rooms had likewise been treated with the fumes of sulphur, either alone or after the above. The thoroughness of these proceedings ensured the absence of plague germs from the earth and walls of the rooms; and yet out of thirty-one such houses it was found that guinea-pigs became infected in nine, a proportion of 29 per cent., or exactly the same percentage that proved infective out of forty-two other rooms experimented with in the same season, which had not been disinfected in any way. The average number of fleas caught in these disinfected rooms was forty, and in one instance as many as 263 were present. The average number in thirteen rooms not disinfected was thirty-four.

A second series of experiments was performed with fleas caught in plague-infected houses and brought to the laboratory in test tubes, where they were placed in flea-proof cages with healthy rats or guinea-pigs.

In twelve experiments with fleas from rats, proved by examination to be plague-infected, there were nine successes (75 per cent.). In ninety-six experiments with fleas taken similarly from guinea-pigs which had been allowed to run freely in plague-infected houses, there were twenty-six successes (27 per cent.).

"It is important to note that the great majority of the fleas caught on the guinea-pigs placed in the houses were rat-fleas (*P. cheopis*)."

Yet another series of experiments in plague-infected rooms was carried out, with the object of showing that animals would contract plague, although protected from floor-infection and from all contact with plague-infected rats, provided they were not likewise protected from fleas. For this purpose pairs of animals were placed in the rooms in cages, so contrived that one was flea-proof and the other open to the entry of these insects.

Thus the floor and upper part of the cages was made of teak wood, but the lower portion of the sides was closed by a double layer of wire-netting, with a space of half an inch between the layers. This effectually prevented the animal inside from contact with the floor or with wild rats in the room, but did not exclude air or fleas.

Half the number of cages were made flea-proof by substituting a layer of fine metallic gauze for the outer layer of netting. In each experiment a pair of animals, one protected by gauze and the other not, were placed in each room. They were left side by side for forty-eight hours, and then brought back to the laboratory, where fleas found on them were removed. In sixty-three experiments carried out in this way all the protected animals remained healthy, while eight, 13 per cent., of the unprotected ones developed plague.

A variation on the above experiment was made by protecting the caged animal, not by gauze, but by "tanglefoot" fly-paper. The cages were modified so as to have a broad base, in the centre of which was the animal, surrounded by a 6-inch area of this sticky paper, on which fleas would be caught when trying to reach the victim in the centre. A barrier of wire-netting was placed round the outer edge of this platform to keep off any wild rats that might enter the room. The control animal was in a similar cage, but the "tanglefoot" was replaced by a layer of sand, so that the fleas might cross the intervening space. The result of fifty-nine such experiments was that all the "tanglefoot" animals remained healthy, while 9 per cent. of those not so protected developed plague. The small number of successes in these two series of cage experiments, as compared with those in which the guinea-pigs were allowed to run about freely, is amply accounted for by the smaller number of fleas obtaining access to the animals. Thus, when the animals were allowed to run freely, the number of fleas per room caught was between twenty and forty; whereas in the case of the caged animals only an average of three fleas per house was taken. Of the 401 fleas caught on the "tanglefoot" papers, 221, or 55 per cent., were rat-fleas; 148, or 37 per cent., were human fleas; and thirty-two, or 8 per cent., were cat-fleas. Plague bacilli were demonstrated in the stomach contents of one out of eighty-five human fleas, and in twenty-six out of 132 rat-fleas dissected.

As above noted, the most common site for the primary bubo was the neck, and it was there also that the fleas were commonly found among the fur.

If rooms are infective because they contain rat-fleas, one would expect to find more of them in plague-infected than in healthy dwellings. And this was found to be the case. In two years in succession observations having this end in view were made.

Thus in 1907 the houses observed were divided into three classes:

(*a*) Those deemed plague-infected, because a plague-infected rat was found in it, or a guinea-pig running loose in it developed plague, or plague-infected fleas were found in it, or fleas from it produced plague in a guinea-pig on which it was placed.

(*b*) Those presumably plague-infected, because a plague case had occurred there, or because dead rats had been reported, though not actually verified by examination.

(*c*) Those definitely known not to be plague-infected, but which were situated in the neighbourhood of, and of the same type as plague-infected ones.

The following table shows at a glance the results :—

Class.	Total Number of Houses.	Total Number of Fleas taken.	Average Number of Fleas per House.
(*a*) . . .	27	784	29·0
(*b*) . . .	73	755	10·3
(*c*) . . .	68	169	2·5

A glance at the third column of figures will show that the houses that were certainly plague-infected furnished nearly three times the average number of fleas that those only presumably infected did, and twelve times the number that uninfected houses did. Of 130 fleas that were dissected, forty-one, or 32 per cent., contained abundant plague bacilli.

To sum up, we find—

1. Guinea-pigs may contract plague if allowed to run loose in plague-infected houses; and many rat-fleas are found on them.
2. In houses where all plague germs are killed by disinfectants, guinea-pigs still die in the same proportion, and an equal number of rat-fleas is found on them.
3. Fleas caught on rats dead of plague are capable of infecting healthy rats or guinea-pigs not otherwise exposed to infection.
4. Fleas from guinea-pigs which have been allowed to run loose in plague-infected rooms, are similarly infective to healthy rats or guinea-pigs not otherwise exposed to infection.
5. Guinea-pigs in cages which protect them from the floor or other source of infection, but which are exposed to the attacks of fleas in plague-infected rooms, contract plague in a certain proportion of cases. Those similarly placed, but protected from fleas, do not develop the disease.
6. Most of the fleas caught in the above manner are rat-fleas, and have plague bacilli in their stomachs in 19·7 per cent. of those dissected.
7. Almost all the primary buboes in animals thus infected are in the neck, and the commonest place for fleas to be found is also in the fur round the neck.
8. Plague-infected houses have twelve times the number of fleas in them that those free from suspicion of infection have.

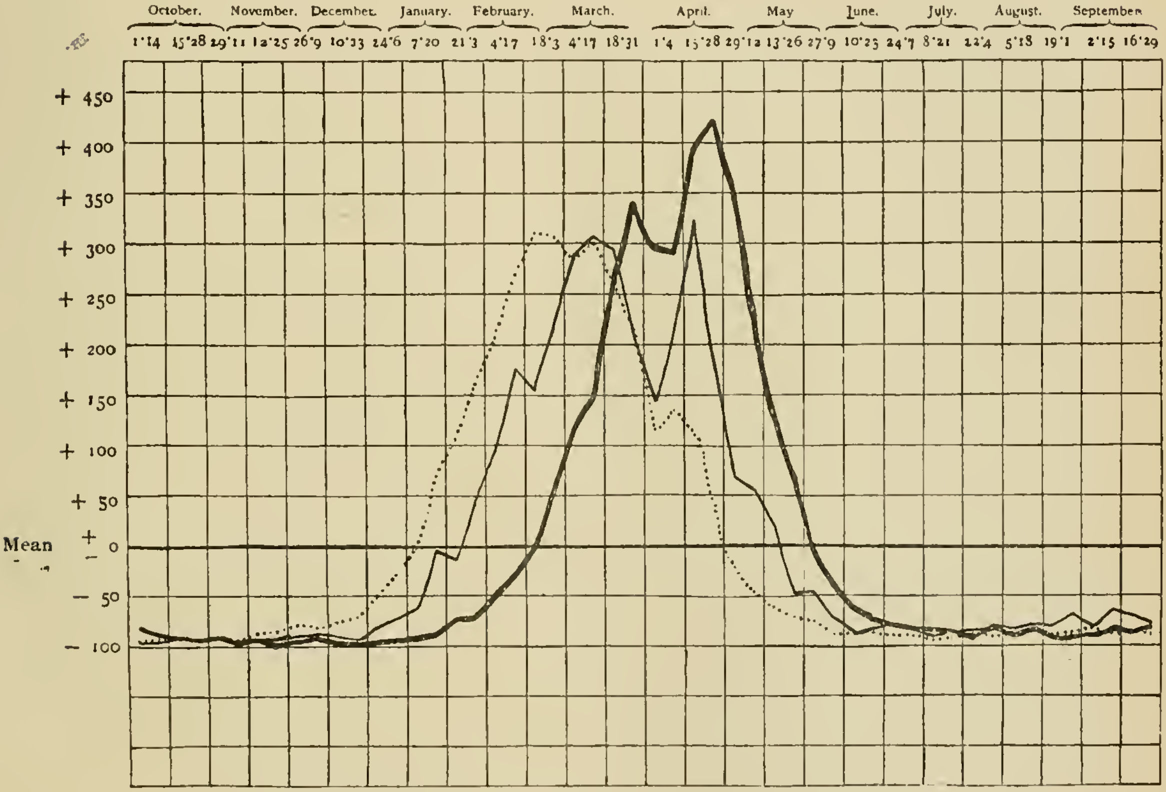
The logical conclusion from the above premises would appear to be, that rooms are dangerous because of the infected rat-fleas in them, and that the soil and air have no infective properties.

Having proved that the means of transmission of plague from rat to rat is the rat-flea, and that houses and rooms are infective only when they contain infected rat-fleas, we must go a step further, and consider what evidence exists to show that this same insect is the cause of the transmission of plague from rat to man, and that it is by its means that plague is spread from place to place.

In considering how man becomes infected, it is important to remember that the avenue through which the germs gain access to the organism is the skin, in so far at least as the common bubonic and septicaemic forms of the disease are concerned. Pneumonic plague may be ignored, as it occurs in only about 2·5 per cent. of all cases.

It is well known also that the primary bubo develops in the glands in connection with the lymphatics draining the area of skin through which the germ enters. The first Plague Commission pointed out that the glands in various situations are affected in proportion to the extent of skin which they serve, and that there was therefore no "seat of election" for buboes. These conclusions are amply confirmed by experiments made by placing infective fleas on definite areas of skin in guinea-pigs, when it was found "that in practically every case the primary bubo developed in the group or groups of glands which stood in direct lymphatic connection with this area of skin." It has likewise been pointed out that races wearing boots have just as great a proportion of groin-buboes as the barefooted Indians.

As has already been noted above, all evidence got in India, whether by the first Plague Commission, the Austrian Plague Commission, or the second Plague Commission, goes to negative the idea that plague is ever naturally conveyed through the digestive tract, and all evidence indicates the skin as the real point of entry. We have also discussed the evidence in favour of the actual agent being the rat-flea.



CHART—Showing the progress of the plague in rats and men.

· · · · · · Infected *M. decumanus.*
—— Infected *M. rattus.*
━━ Human deaths from plague.

If we study the chart, showing the curves of rat-plague and human-plague deaths in Bombay city, we see clearly that there is a definite time-relationship between the *rattus* epizootic and the epidemic. Where the epidemic curve crosses the mean line, we see that the interval separating it from that of *rattus* is about three and a half weeks; as it reaches the summit the interval is reduced to a fortnight. As the second apex is reached, the interval is still further reduced to a week, so that the mean interval may be said to be from ten to fourteen days. Now, can this interval be accounted for on the flea hypothesis? I think it can. Thus, if, following Major Lamb, we divide the period into three, we find—

(*a*) A period corresponding to that between the disappearance of the rat, the natural host of *P. cheopis*, and the time when the flea, pressed by hunger, will attack man. This was proved, by a large series of experiments carried out in the laboratory, to be three days. It was also found by experiment that fleas taken from plague-rats are most infective during the first four days, and then rapidly become less so.

(*b*) A period corresponding to the incubation stage of plague, which has been fixed by the first Plague Commission at three days.

(*c*) A period corresponding to the average duration of plague in human beings; this has been found to be about five and a half to six days.

If these three periods be added together, we find the period to be eleven and a half to twelve days, which corresponds very closely to what the facts of the epidemic in Bombay city require. That this is the true explanation is supported by certain observations carried out in the village of Kasel in the Punjab, as to the interval that separated the discovery of plague-rats in a house and the subsequent appearance of plague among the inmates. "In five houses, in which plague-rats were found on only one occasion prior to a human case, the average interval between the two was ten days. In fourteen houses, in which plague-rats were found on more than one occasion prior to the human attack, the average interval between the finding of the first plague-rat and the first case was twelve days, while the average interval between the last plague-rat and the first case was seven days. These intervals correspond closely with those deduced from the curves representing the *rattus* epizootic and the epidemic both in Bombay and in Kasel itself."[1]

Further, we have already seen that plague-infected houses are infective to animals only because they harbour plague-infected fleas. We have likewise seen that monkeys are just as liable to be infected in the godowns as guinea-pigs, and they also contracted plague on several occasions when exposed in cages in plague-infected rooms. It would seem therefore not improbable that man exposed similarly to flea-bites from infective fleas, would likewise contract the disease in this manner. Now Liston has shown that rat-fleas attack man and other animals not their natural hosts, in the absence of the latter. The Commission therefore made other experiments and observations to confirm this, and arrived at the following conclusions. When a man introduces his hand into a cage containing rat-fleas, they will jump on to the skin, and if given time will bite. Unless very numerous, however, they will not attack the hand or arm in the presence of rats. When starved for seventy-two to ninety-six hours, fleas will readily feed on man.

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[1] Lamb, p. 51.

When the attendant entered one of the experimental godowns in which rat-fleas were numerous, he always brought out some on his bare legs, and it was the routine practice to station a man outside with a pledget of chloroformed cotton-wool in his hand, to capture these fleas. On one occasion, when a servant went in four times in quick succession merely to remove cages, forty-four fleas were thus captured on his legs.

So common did the attacks of fleas become, that the members of the Commission when visiting plague houses wore top-boots, into which their trousers were tucked, like so many Russian officers, or at least secured their trousers round their ankles by cycle clips. The bare-legged attendants, who could not afford such luxuries, were only saved from infection by regular injection of Haffkine's anti-plague vaccine. As an example one instance may be quoted. "In one house in particular, which the inhabitants had evacuated after a severe rat mortality, many rat-fleas were caught on successive days on a man who went inside only for a short time; thus on 18th April fifty-one, on 19th April thirty-four, and on 20th April sixty rat-fleas were taken in this way."[1] It is quite manifest, then, that in certain circumstances, and especially in the absence of rats, *P. cheopis* will attack man and feed upon him. Why should it not infect him likewise, as it does his near relation the monkey?

Granting that the rat-flea is the means by which man is infected, the question arises, How is it done?

The Commission, by measurement and calculation, discovered that the stomach of a flea is large enough to contain the amount of blood necessary to enable it to imbibe many plague bacilli from the plague-infected rats of Bombay. They likewise found that the germs multiplied in the stomach in a large proportion of the fleas examined during the epidemic season, but in a much smaller proportion of those thus examined in the off season.

After this multiplication, the germs are passed in abundance per anum, and thus become deposited on the skin of the host, while its blood is being sucked. There is no evidence to show that any transformation of the germ takes place in the body of the flea, nor that it can escape from it by the mouth or salivary duct. It has been experimentally proved that the fæces thus deposited are infective through the pricker wound, even without rubbing. The duration of infectivity of fleas has been estimated at fifteen days during the epidemic season and seven days in the off season. Starved fleas die within a week, while those fed on human blood survive for three weeks. It is possible though not probable that a single flea could transmit the infection. Both male and female fleas can transmit the infection. *P. felis*, the common cat and dog flea, cannot transmit the infection, but both *Ceratophyllus fasciatus*, the common rat-flea of Northern and Central Europe, and *P. irritans*, the species found on man, are capable of doing so, the former with ease, but the latter only with difficulty, in the case of animals such as the guinea-pig at least.

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[1] Lamb, p. 54.

All these facts have an important bearing on the question of the spread of plague from one place to another, which is the last point I have time to take up to-night. The first Plague Commission remark on this point: "In comparison with travellers, all other agencies which have been engaged in the distribution of plague from place to place are quite unimportant."[1]

The additional experience accumulated in India since this opinion was given agrees with it, and has led to the gradual withdrawal of restrictions on the importation of grain and other merchandise which an energetic Sanitary Department had in some cases recommended in the early days of plague.

If man, then, is the sole means of introducing plague into fresh localities, how does he do it?

We have seen that rat-fleas will feed on man, but it was also discovered that often though the fleas hopped on to the skin yet they did not bite for some time. Also as fleas fed on man may remain alive for three weeks and may remain infective for fifteen days, there is ample time for fleas to be transported from place to place with passengers, and at the end of the journey be capable of infecting the rats of the new locality. It is a common experience that the man bringing plague to a village does not himself prove the first victim; he may even escape infection altogether. What happens is that the fleas brought by the visitor escape to the abundant rats in this plague-free village and infect them. This starts an epizootic, rats die and disappear, and the many infected fleas left behind attack man and produce an epidemic. Of course the importer may himself develop plague in the process, but this is not a certainty, many cases on record proving the contrary.

An importer even is not necessary, for clothes with fleas in them may be sent by post or otherwise, and their insect inhabitants prove infective up to a week at least. That this may really take place is proved by experiments carried out with the clothing of plague patients. Such clothing placed in a flea-proof godown proved infective to healthy guinea-pigs, and on them were subsequently taken rat-fleas with plague bacilli in their stomachs.

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[1] Vol. v. p. 115.

"In conclusion, then, we may state that all evidence points to the usual method of the importation of plague from an infected to an uninfected locality being by means of infected rat-fleas, and to the fleas being brought by human agency, namely, by healthy men, by plague cases or in their belongings."[1]

The importance of the above researches in reference to the measures that should be adopted for the control of plague, cannot be overestimated. They provide us for the first time with a scientific and sure basis from which to work, and have shown how futile were our efforts in the beginning, however well meaning they might have been. To set forth bearing of these researches on the possibility or otherwise of separating the people from the rats, or of exterminating rats or fleas, would require another paper of at least equal length to this one. I would therefore, in conclusion, merely sum up in general terms.

General Conclusions.—1. Pneumonic plague is highly contagious, but being rare (less than 3 per cent. of all cases) plays a very small part in the spread of the disease.

2. Bubonic plague in man is not infectious, and is entirely dependent on the disease in the rat.

3. The infection is conveyed from rat to rat, and from rat to man, solely by means of the rat-flea.

4. Plague is usually conveyed from place to place by rat-fleas brought by people in their baggage or on their persons.

Note.—It seems necessary to explain why the name of Dr. Ashburton Thompson of Sydney, who has been such a strenuous advocate of the flea-transference hypothesis, has been omitted from the above paper. It is simply because Liston had already arrived at his conclusions before Dr. Thompson had done more than surmise that fleas were perhaps the cause of the plague in Australia. In Dr. Thompson's own laboratory in Sydney, Tidswell tried experiments with fleas in 1900, but failed to confirm Simond's experiments, yet in spite of this he inclined to the opinion that Simond was right.

This opinion he arrived at from the consideration of purely epidemiological facts collected by him during successive epidemics at Sydney. This first report was published in 1900, the second in 1903, and subsequent ones followed in each year up to 1906. His mature opinions will be found in a paper published by him in the *Journal of Hygiene*, vol. vi., for 1906. These reports are well worth reading as an example of what can be done by the collection and analysis of epidemiological facts alone, and they in every way confirm the conclusions arrived at by the second Indian Plague Commission, and are therefore of extreme value and interest.

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[1] Lamb, p. 83.

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BRITISH AND FOREIGN LITERATURE.

Obstetrics: A Text-book for the Use of Students and Practitioners. By Professor J. WHITRIDGE WILLIAMS. Second Edition. London: Sidney Appleton & Co.

In the light of present knowledge, it is difficult to imagine a better guide to the science and practice of midwifery than is found in Williams' "Obstetrics." The book is certainly unsurpassed, and it is doubtful if it is equalled in merit by any other text-book on the subject. The second edition indicates careful and thorough revision, and important changes have been made. The chapters on the "Development of the Ovum" and upon the "Toxæmias of Pregnancy" have been entirely rewritten, and sections have been added on the "Metabolism of Normal Pregnancy," "Vaginal Cæsarean Section," "Pubiotomy," and "Contractions of the Pelvic Outlet."

The chapter on the "Toxæmias" is an excellent one, in which Dr. Williams discusses fully the entire subject, and gives his reasons for including various supposed diseases of pregnancy among the toxæmias. He is careful to point out that one must be cautious in accepting new theories, as the fact is that we are just beginning to realise our profound ignorance of the subject.

In cases where rapid delivery is called for before the os uteri is dilated, Dr. Williams considers that vaginal Cæsarean section is the ideal method. He condemns Bossi's dilator as a most dangerous instrument, and one likely to lead to deep cervical tears, while Dührrsen's cervical incisions are also strongly disapproved of.

All British obstetricians will not endorse Williams' emphatic advocacy of pubiotomy. He repeats the arguments in support of this operation which, though some condemn both operations, is more favourably considered than symphysiotomy. In pubiotomy there is less risk to the bladder and the urethra, and better union and a more rapid convalescence are ensured. The author considers that pubiotomy will displace Cæsarean section in the so-called "border line" cases, as it enables one to subject the patient to the test of labour and to operate after several hours of second stage pains have demonstrated that the head cannot pass through the superior strait. He believes, too, that pubiotomy will narrow the field for the induction of premature labour, and do away with the use of high forceps, version or craniotomy, in moderate degrees of contracted pelvis when the mother is in good condition. He says it is also indicated in certain cases of funnel-shaped pelvis, and possibly in face presentation when the chin has rotated into the hollow of the sacrum. Many obstetricians would not so extend the list of indications for this operation, and it is certain that in this country the induction of premature labour and, though less frequently, craniotomy will continue to be the operations of election in certain cases.

The bacteriology, the causes and treatment of septic fever in its various puerperal forms, are fully discussed in an excellent chapter. The author does not find that serum therapy has proved more satisfactory than other methods of treatment. The cases in which curettage and intra-uterine douching—methods somewhat apt to be overdone—will prove beneficial, are clearly pointed out, and the risks of these minor operations in many cases are strongly insisted upon.

In this edition many of the old illustrations have been replaced and a number of new ones added. They are all well chosen and reproduced.

The style of the whole work is clear and original.

The Essentials of Cytology. By C. E. Walker, Assistant Director of the Cancer Research, Liverpool. London: Archibald Constable & Co. Ltd.

This is really an epitome of the intricate subject of *cell-division.* The title of the volume is a trifle misleading, as only some seventeen or eighteen out of a total of 130 pages are devoted to the subject of general cytology, and consist of an elementary and rather incomplete description of cell structure. By far the greater part of the book is taken up with the description of the varieties of cell-division, special attention being given to that occurring in gametogenetic cells. On p. 20, we note that the author gives the usual division of the phenomena of ordinary mitosis, namely, prophase, metaphase, anaphase, and telophase; but in his detailed description of these processes we are unable to find any further mention of the second and most important, the metaphase or division of the chromosomes, the inaccurate statement being made that the splitting of the chromosomes "is the commencement of the anaphase." Other minor inaccuracies somewhat detract from the value of the descriptions given. When the author passes on to discuss some of the highly controversial problems of heterotype and homotype mitosis, those errors which we have pointed out as occurring in the more elementary part of the book rather tend to shake the confidence of the reader when he comes to peruse the chapters in which the author proceeds to deal with the more complex phenomena of mitosis and allied processes in gametogenetic cells. For the period during which reduction of the chromosomes is occurring, he suggests the useful name "meiotic" phase—from which there can be derived the other equally useful descriptive terms "pre-meiotic" and "post-meiotic"—a suggestion which may help to abolish the unfortunate and confusing terms "heterotype" and "homotype mitosis" which have been introduced in this connection.

The ambiguity produced by the somewhat sparing use of commas in the text often renders it necessary for the reader to go back and re-read some passages in order to grasp the meaning intended to be conveyed. The usual idea that "the greater includes the less" seems to be controverted by the wording of the sentence found on p. 53: "In mammals, in many if not in all vertebrates, in some Arthropods, Mollusca," etc. We do not, however, wish altogether to take up the position of the carping critic, and we think that, were the name of the book altered to, say, "Chapters on Cell-Division" or some such modest title, and with a little more attention to accuracy of detail—also the correction of such misspellings as "toludin" for "toluidin," and printers' errors such as are found in line 6, p. 110—the author's work, in compiling this volume from various papers by himself and his colleagues in the Liverpool School, would not by any means have been in vain. We would, however, also suggest that, should another edition of his book appear, the author will be well advised if he makes some reference to the recent and important work upon heterotype mitosis and allied phenomena by well-known cytologists, who do not altogether agree with the teaching of the Liverpool School upon this subject.

Practical Diagnosis. By ROBERT AMORY HARE, M.D. Sixth Edition.
London: Henry Kimpton.

THE character of this book is clearly enough indicated by the sub-title—"The Use of Symptoms and Physical Signs in the Diagnosis of Disease." It is a clinical manual in which prominence is given to what are conventionally known as "physical signs," including under the term physiognomy, gait, temperature, and the like, and to some extent subjective symptoms, while clinical chemistry and pathology are relegated to the background, or, at least so far as purely laboratory methods are concerned, left entirely out of consideration. The subject-matter is arranged regionally; signs connected with the facies, the limbs, the mouth, thorax, abdomen, pulse, fæces, urine, etc., being considered in turn, and thereafter the significance of such important phenomena as fever, headache, pain, convulsions, coma, and so on, inquired into. By pursuing this method the whole range of medicine is covered, and this in an eminently thorough and practical way. As might be expected from one of Dr. Hare's reputation, the volume is singularly free from the blemishes which are often found in books of this description; we refer particularly to faulty appreciation of the relative diagnostic importance of symptoms in different diseases. Dr. Hare's experience enables him to avoid this kind of error, and we congratulate him on the appearance of a sixth edition of his treatise.

In reading the book, one or two criticisms occurred to us. Among joint affections, syphilitic synovitis is not mentioned, yet its characters are well defined and almost pathognomonic. The examination of the Achilles jerk ought to be referred to in future editions. Among passages which would stand revision is one concerning cyanosis (p. 138), from which the unwary might infer that patent foramen ovale is, if not the only, at least the chief cause of cyanosis in the newly born. It is very doubtful whether thickening of the vessel wall is so negligible an affair in sphygmanometry as is stated on p. 273. For the detection of occult hæmorrhages the aloin turpentine test is recommended; should some of the more recent and delicate reactions (*e.g.*, the benzedin test) not have been preferred? Dr. Hare quotes a statement that clear cerebrospinal fluid excludes all inflammatory conditions of the meninges except tubercle; as a matter of fact, the fluid is very often quite translucent in post-basic meningitis. The method of estimating the red blood corpuscles by the hæmocrit might well have been omitted; it is inaccurate, and has never found a place in serious work. The book is well illustrated with original and borrowed plates. There is surely, however, a mistake in the description of that on p. 555 as "the normal Babinski reflex in health." These criticisms must not be taken as detracting from the value of the book. Rather do we submit them to the author in view of future editions.

A Text-book of Physiology. By ISAAC OTT, A.M., M.D. Second Edition. Philadelphia: F. A. Davis Company.

THE second edition of this text-book is a bulky volume. It has been enlarged by the addition of 240 pages, and much new matter has been inserted, but in its arrangement the original plan has been adhered to.

The author tells us that his aim was to write, not a treatise, but an elementary work containing the main facts of physiology which it is necessary for the student of medicine to know. In our opinion it cannot be said that he has succeeded in his object. The book contains so many mistakes on fundamental points that it is entirely unsuited for beginners, but might be read by those who already know the subject and are in a position to sift the grain from the chaff.

On p. 95, *e.g.*, we are told that the islets of Langerhans and the centro-acinar cells are alternative names for the same structures. On p. 54 it is stated that "the duct of the parotid called Stenos has the diameter of a crow quill." The reader is left in doubt as to whether it is the duct or the parotid that is called Stenos. The chapter on the anatomy and physiology of the nervous system is particularly weak. In tracing upwards the fibres of the columns of Goll, the author says they "ascend to the medulla, where they pass without decussation into the post-pyramidal nucleus or nucleus of Goll. By this nucleus it is carried into the cerebellum following part of the restiform body; another part is placed in relation with the nuclei of the pons." No mention is made of their main connection with the great sensory tract, the fillet, and the student is left to infer, if he can take any meaning out of the above statement at all, that they end in the cerebellum and pons. On p. 564 the descending nucleus of the fifth nerve is described as *giving origin* to the trigeminus. The sensory (afferent) nerves are nearly always referred to as *sensitive* nerves.

The book, however, is not without its merits. The introduction to the chapter on reproduction is excellent. It is not a work that is likely to take a high place amongst American text-books of physiology.

Electro-Therapeutics and Röntgen Rays. By M. K. KASSABIAN. London: J. B. Lippincott Co.

IT is, we fancy, impossible for one man to keep thoroughly up to date on all branches of his subject, and electro-therapeutics has many branches, but Dr. Kassabian has made an earnest endeavour to do so. Perhaps the most personal and therefore strongest parts of the book are those dealing with "Galvanism," "Faradism," and "X-Rays." Other parts are good, but there is more hearsay evidence, some of which is already controverted by more recent experience.

The study of X-rays occupies three-fourths of the volume, and the parts dealing with their use in clinical diagnosis is specially to be recommended. The author has devised several head-rests for the localisation of disease or foreign bodies in all parts of the cranium, and these as well as many other forms of apparatus are fully described. We are pleased to see that he lays stress on proper arrangements for negative viewing, which is too often loosely carried out.

The tabulated lists to guide in photographing different parts are very useful, and these, with the accounts of experiments and the valuable series of bone photographs, are all written by one who evidently knows, and, furthermore, can impart his knowledge clearly.

The very encouraging results with X-rays and high frequency in the case of epileptics is of great interest. In conclusion, we may state that the text is good, the meaning lucidly conveyed, and that there is a commendable terseness which is agreeable without being dull.

Studies in Blood Pressure. By George Oliver, M.D. (Lond.). Second Edition. London: H. K. Lewis.

Although it still remains of modest dimensions, the second edition of Dr. Oliver's brochure has undergone considerable amplification through the incorporation of new material and fresh observations. The author's ingenuity in devising new methods of clinical research finds expression in these pages, and his descriptions of the various instruments bearing his name, along with the very precise instructions and cautions given concerning their use, are not the least valuable parts of the book. He appears to hold very much the same views as Dr. Russell on the value of hæmanometric readings when the vessels are thickened, and shows very clearly how unreliable "armlet" methods alone are under these circumstances. His observations seem to indicate that we may find an easy means of checking this source of error by comparing the "armlet" readings with those made at the radial artery with the hæmodynamometer. A very simple and ingenious method of estimating the venous pressure without special appliances finds mention. The physiology and pathology of blood pressure are discussed at some length, and, considering the complexity of the subject, with commendable simplicity. A praiseworthy feature of the book is the ample space—nearly a quarter of the pages—given to treatment. The dietary in high pressure is not unlike that advised by Russell. Dechlorination (by the way, the French word is "*déchloruration*" not "*déchlorisation*," as in the footnote, p. 179) is advised as worthy of trial, and it is suggested that by modifying the salts of the plasma we may be able to secure the desired reduction of blood pressure. We are reminded, however, that high blood pressure is sometimes the price paid for circulatory efficiency, and that it is not always advisable to attempt to remove what may be compensatory, and a defensive mechanism. Dr. Oliver's book may be heartily commended as a readable and instructive treatise.

A Manual of Prescribing. By C. R. Marshall, M.D. London: J. & A. Churchill.

A new book on prescribing cannot be expected to differ very materially from those already in the field, nevertheless Dr. Marshall's manual seems to us to be in many ways superior to most of its competitors. There are signs that a reaction is beginning to set in against the baneful practice of indiscriminately and uncritically prescribing proprietary formulæ, and that it is being recognised that equally attractive preparations can be ordered and dispensed with due regard to the special needs of individual patients. It is very desirable that the custom should be fostered, and such a book as Dr. Marshall's is eminently adapted to do this. Although in his preface he disclaims having written a treatise on the art of dispensing, he devotes a chapter to the subject, and really deals with it more fully than most authors. This, we think, will be found a very profitable part of the book, because, however little prospect a reader has of himself compounding pills, emulsions, or mixtures, he is all the better of knowing something about the difficulties and methods of dispensing. Useful information of a similar nature is given in the chapter on the forms of medicines. The section on incompatibility is ample for all practical purposes, and the illustrative formulæ with which the text is interspersed are well selected. Altogether, Dr. Marshall's book is very interesting: it is neither large nor expensive, and ought to be in the hands of every medical student.

Protozoa and Disease, comprising Sections on the Causation of Smallpox, Syphilis, and Cancer. Part II. By J. Jackson Clarke. London: Baillière, Tindall, & Cox.

Nearly one-half of this volume is devoted to a consideration of the various bodies found in the cells of human cancers and the infective granular tumours of dogs, both of which diseases, according to the author, are caused by more or less local infection by Protozoa, and differ from each other only in the more intimate character of the parasitism and the more complicated life-history in the case of cancer. Although the author, with considerable assurance, regards the bodies above mentioned as parasitic Protozoa, and suggests that some of them resemble Suctoria, owing to their possession of structures like knobbed tentacles, the impression in the mind of the reader is that some of these bodies are capable of interpretation as degenerate nuclear products, and the nature of the others must, it seems to us, be still considered to be highly problematical. The occurrence of the same "parasitic" bodies (for instance, Plimmer's bodies) in both syphilis and cancer calls for explanation in view of the improbability that (assuming cancer to be due to a parasite) two such widely different diseases can have one and the same causal organism. The author supports Calkins' view of the protozoan nature of the Guarnieri bodies of smallpox and vaccinia, and also attributes to the presence of protozoan parasites certain cysts found in cystic disease of the urinary tract. There are fragmentary notes on some tropical diseases—trypanosomiasis, Kala-azar, amœbic dysentery—and on piroplasmosis and ticks. In the notes on ticks we observe the misstatement that *Boophilus bovis* has been renamed by Pocock *Alectorobius*, and that it belongs to the *Argas* family, whereas Pocock renamed it *Margaropus*, but left it, where it ought to be, in the family Ixodidæ. The genus *Glossina* is not limited to Africa, as stated on p. 29, for *G. tachinoides* was recorded from Arabia in 1906.

The Functional Inertia of Living Matter. By David Fraser Harris, M.D., B.Sc. (Lond.), F.R.S.E. London: J. & A. Churchill.

In a small volume of 128 pages, Dr. Fraser Harris describes, as a property of living matter, a physiological counterpart of "irritability," to which he gives the name "functional inerita." Life, he considers, is the result of the simultaneous possession of and due co-ordination between these two primary properties, and the phenomena of vitality cannot be adequately conceived in terms of one or other alone. The property with which living matter is thus endowed is the fundamental principle underlying many of the phenomena exhibited by the organism as a whole and in its several parts. It explains the latent period which elapses between stimulation and response in the various tissues of the body; it is at the root of the various rhythms, respiratory, vasomotor, the tremors of muscles and even of habits such as the daily evacuation of the rectum at a certain hour; it is seen in the periodicity of hemicrania, menstruation in the female, fits of irritability in the male, and is the cause of the sleeplessness often experienced by nurses who have been changed from night duty to day duty. Many of the problems of heredity, the maintenance of the ancestral character, atavism, and hereditary tendencies, are the expressions of functional inertia. To it we owe the assertion of genius, the inspiration of Shakespeare, the rise of Napoleon, the art of Michael Angelo, the music of Schubert,—the appearance, indeed, of all the great figures in the world's history. National characteristics are explained on the same grounds; functional inertia decrees the rise and fall of Eastern nations and the stationary position of China; it explains the constancy in the number of suicides and of umbrellas left in trains every year; it even stands in the way of female suffrage, because "the majority of Radical politicians hesitate to grant the parliamentary suffrage to women, on the ground that, in virtue of this very mental characteristic, they would almost certainly vote on 'Conservative lines.'"

In support of his argument, Dr. Fraser Harris quotes from the writings of many distinguished men who have made use of the term "inertia," or an expression equivalent to it, in connection with living material. They make a formidable list, but whether they would agree with the construction put upon their observations or not, is at least open to doubt. The book shows evidence of much care in preparation; the argument, however, is far from convincing, and is at times extremely fanciful. The author would have made a better case if he had not traversed so wide a field.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF
J. S. FOWLER, M.D., F.R.C.P.Ed.,
PHYSICIAN, ROYAL HOSPITAL FOR SICK CHILDREN.

Rickets and Osteomalacia. Microbic Cyanosis.

Late rickets, and the relationship between rickets and osteomalacia.—Looser contributes a long and important paper (*Mitth. a. d. Grenzgebiet. Med. u. Chir.*, Jena, 1908, Bd. viii. SS. 678–744) on this difficult subject. The case on which the paper is based is described in great detail; its leading features are as follows:—The patient was a prematurely born imbecile, and probably, but not certainly, suffered from rickets in infancy. At the age of 13 he fractured his femur from very trifling violence, and at that time it was noted that he showed the ordinary "sabre deformity" of the tibiæ, increase of the tendon reflexes, and general extreme muscular irritability. Spontaneous fractures recurred during the 15th and 16th years, and there was contemporaneous enlargement of the epiphyses. In consequence of the fractures and spontaneous bending of the long bones, the limbs became unusually deformed (the photograph shows the legs as completely doubled back on themselves, as well as a marked enlargement of the epiphyses of the wrists, and scoliosis), and one of them had to be amputated on account of pressure ulcers due to its abnormal position. From the 17th year no more fractures; the skeleton has since that time consolidated. The patient is now 27 years old. A careful examination was made of the amputated limb; for details of the histology, the original must be referred to.

When one tries to place such a case in any of the recognised categories of disease, rickets has first to be considered. As the first and clearest evidence of that disease, the bones of the amputated limb showed periosteal and endosteal deposits of imperfectly calcified substance; second, there was deficiency of the zone of temporary calcification of the epiphyses, and enormous overgrowth of the epiphyseal cartilages. The appearances, however, differed to this extent from rickets, that the atrophy of the older parts of the bones was more marked than in that disease. This, however, does not exclude rickets; it is explained by the age of this patient as compared with that at which rickets ordinarily occurs. Further, the case undeniably presents clinical and anatomical resemblances to osteomalacia,—the fragility of the bones, the muscular hypertonus, the exaggerated reflexes, and the atrophy of the bones. Ostitis fibrosa, osteogenesis imperfecta, syphilis hereditaria tarda, and scorbutus can all be excluded by the microscopic appearances.

After a study of the reports of late rickets and juvenile osteomalacia, Looser confesses his inability to find any criterion by which the one can be distinguished from the other: late rickets and juvenile osteomalacia form an indivisible whole, from which "rickety" alterations in the cartilage are never absent, and in which atrophy of bone is a prominent symptom. *Clinically*, all grades are described, from a mild, curable disease to the most aggravated fatal types; the latter, if we dismiss from our notice the typical rickety changes in the epiphyses, realise in all respects the picture of the worst forms of adult osteomalacia. Up to the present about sixty cases are on record, two-thirds in girls, one-third in boys. The cases fall into two groups, according to the origin of the disease—(1) In the smaller group the malady began in infancy, and progressed steadily into later childhood or adolescence. Such children either walk very late, or never learn the art at all; they are in miserable general health, and show excessive deformity of the limbs and spine, with enlargement of the epiphyses. (2) More common than these is genuine late rickets. This occurs either as a recidive of rickets which has been recovered from in childhood, or, more frequently, develops for the first time between the 11th and 17th years, or later. The development of the previously healthy patient undergoes arrest; he is easily tired, complains of pain in the bones, and gives up walking; simultaneously therewith the epiphyses enlarge, and, unless the patient is safeguarded, deformities, such as kyphosis, bending of the limbs, genu valgum, malformation of the pelvis, take place. No deformity has been described in late rickets which has not also been recorded in juvenile osteomalacia, and *vice versâ*. At the height of the malady the development is very backward; the patients are infantile, the eruption of teeth ceases, and the onset of puberty and the acquirement of the secondary sexual characters is retarded. Fragilitas ossium occurs in almost all bad cases; the bones are as brittle as in the worst forms of adult osteomalacia. Union of the fractures is slow, but pseudo-arthroses are rare. Radiograms of both late rickets and juvenile osteomalacia regularly show—(1) Epiphyseal enlargement, (2) broadening and irregularity of the epiphyseal cartilages, (3) osteoporosis and atrophy. Analysis of fifteen post-mortem reports shows that, whatever the disease was called, there was always atrophy of bones and enlargement of the epiphyses. It is as impossible to separate the two diseases by reference to the age of the patients as on pathological grounds. Juvenile osteomalacia may begin before the 10th year, and late rickets after the 20th. They are therefore one disease, characterised by defective calcification of the newly deposited bone, atrophy of bone, and epiphyseal swelling; the more severe these changes, and the later their occurrence, the closer the resemblance to adult osteomalacia.

In addition to the above group of cases, some of the *common deformities of adolescence* undoubtedly come under the same heading. These are kypho-scoliosis, genu valgum, genu varum, and coxa vara. The essentially rickety nature of these was pointed out by Mickulicz, who found a moderate degree of broadening, and irregularity of the proliferating zone of the epiphyseal cartilage in genu varum; he also described beading of the ribs and enlargement of the lower ends of radius and ulna as common in this series of affections. Thiersch confirmed these observations in genu valgum. In coxa vara, changes suggestive of osteomalacia were described by Langhans; of rickets, by Haedke. More recently, Schmorl, by a systematic examination of the bones of all the young subjects who came to the post-mortem room, could demonstrate moderate degrees of rickety change in many patients dying of other diseases, and clinically showing no evidence of rickets. Mild or commencing late rickets may show no clinical sign of epiphyseal swelling, as such case-histories as the following prove: An 18-year-old girl began to complain of weariness in walking; no epiphyseal enlargement until three months later.

The latter part of Looser's paper is almost entirely pathological, and concerns the relation of rickets to osteomalacia in general. He sketches the history of the question. Before Virchow's time the diseases were regarded as fundamentally the same: rickets the osteomalacia of the growing bone, osteomalacia the rickets of the mature bone. Virchow changed this: rickets was a disease of cartilage, the other of bone; rickets a hypertrophic, osteomalacia an atrophic, process. Subsequently Cohnheim and Kassowitz favoured the unity of the two diseases, the changes being, in the view of the latter, due to an "inflammatory hyperæmia." Pommer came to the same conclusion, and later work is rather in the direction of interpreting the nature of the changes, than in drawing distinctions. Looser then gives his own observations on the histology of the condition, and concludes that rickets and osteomalacia are a single identical affection, which may affect the skeleton at any age, but is most liable to do so at the periods—infancy and adolescence—when skeletal growth is most active. The clinical and anatomical characters are modified by the different physical circumstances at different periods of life.

Microbic cyanosis.—Under the heading "Enterogenous Cyanosis," the literature of this subject was given in abstract in this Journal in April 1906, and since that time some further important observations, made on the condition by Gibson in this country and Blackader in Canada (*Med. Journ.*, N.Y., 1907, March 16), have independently shown that it may arise from the invasion of the blood stream by the colon bacillus. Gibson and Carstairs Douglas (*Lancet*, London, 1906, July 14) describe the following instance of the malady. The patient was a lady, æt. 36, who had suffered for some years from headaches, giddiness, and faintness, and latterly from diarrhœa and general gastric disturbance. Her most obvious symptom, however, was cyanosis; the face and hands had a lavender hue, and the lips, ears, and nails were almost as dark as bilberries. There was no clubbing. The blood showed evidence merely of a moderate secondary anæmia. Urine was of low specific gravity, with a trace of pus and albumin; low percentage of urea, and a few hyaline casts. The first suggestion made was that the lady suffered from blood destruction, caused by a too free indulgence in aniline derivatives, which she had been using for the relief of headache; it was accordingly decided to eliminate these as a possible cause. Notwithstanding abstinence from such drugs, the cyanosis did not become less, but after the expiry of eight months was just as intense as it had ever been, although it varied somewhat from day to day. A diagnosis of methæmoglobinæmia, due to changes in the intestine, was then made. Blood from the ear gave the characteristic spectrum of methæmoglobin in dilute solution,—the narrow band in the red between the C and D lines, as well as the ordinary bands of oxyhæmoglobin at D and E. It yielded a crimson solution in water, instead of a red solution, as ordinary blood does. On the addition of ammonium sulphide the characteristic phenomena of the methæmoglobin spectrum were perceived,—that is, the red band disappeared promptly, leaving the bands of oxyhæmoglobin at D and E, while these merged more slowly into the broad, ill-defined band of reduced hæmoglobin. The blood was tested for the presence of nitrites by the addition of sulphanilic acid, naphthylamine, and acetic acid,—a method of such delicacy that so little as $\frac{1}{4200}$ gr. of nitrous acid can be detected. The reaction was positive. The saliva gave a much more pronounced reaction than normal saliva. The fæces were acid, very offensive, but not unduly rich in sulphuretted hydrogen, and gave only a slight nitrite reaction. They contained no blood, and did not produce methæmoglobin when incubated with fresh ox blood. These facts, therefore, indicated that methæmoglobin was very distinctly present in the blood, but not in the stools; that nitrites were present in the blood and saliva, but only in traces in the fæces; and that the latter were destitute of any power of altering the normal hæmoglobin of ox blood to methæmoglobin. This seemed to point to a hæmatogenous formation of nitrites, possibly due to bacterial activity there. Further research showed that an organism of the colon group could be obtained in pure culture from the blood. Provisionally, Gibson interprets the case thus: From an original source of mischief in the bowel a systemic infection occurs; nitrites are being continuously produced in the blood, and therefore a varying quantity of hæmoglobin is converted into methæmoglobin. In a later communication (*Quarterly Journ. Med.*, 1907, October) the further progress of the case is related. Following a careful course of intestinal antisepsis, the cyanosis has shown great abatement. Spectroscopically the blood shows no abnormality, only the oxyhæmoglobin band being present. There is still, however, a trace of nitrite, but no *Bacillus coli* can be grown from it.

SURGERY.

UNDER THE CHARGE OF

ALEXANDER MILES, M.D., F.R.C.S.Ed.,

LECTURER ON SURGERY, SCHOOL OF MEDICINE, EDINBURGH.

On the Treatment of Sarcoma.

Within the last few years surgeons have shown a distinct tendency to adopt a more conservative attitude with regard to the treatment of sarcomata, particularly sarcoma of the bones of the extremities. The operation of high amputation, formerly recommended for all sarcomatous growths, has failed to justify the claims put forward for it. The first step in the direction of restricting amputation was taken when it was shown that the myeloid sarcoma, or more correctly the myeloma, can be eradicated by resection or enucleation, and this line of treatment has been extended to the majority of central sarcomatata and to some fibro-sarcomata, with satisfactory results. The mutilation involved in amputation therefore is neither necessary nor justifiable for this comparatively benign group of tumours. Accumulated experience, backed by statistical evidence, goes to show that for the more malignant forms,—the periosteal sarcomata, the small round-celled tumours, and the neurosarcomata,—amputation is futile in the vast majority of cases, few patients surviving the operation without recurrence or metastasis more than a year or two.

A most suggestive paper on this subject is contributed by Babcock and Pfahler (*Surg., Gynec., and Obst.*, Chicago, 1908, February). In illustration of the futility of amputation, they quote Butlin's collection of sixty-eight cases of amputation for periosteal sarcoma of the femur, in which only one patient was known to be alive three years from the time of operation, and in this case there was doubt as to the periosteal origin of the tumour; and eighteen cases of periosteal sarcoma of the humerus of which only two were cured, and here again there was doubt as to the diagnosis. The only patient who survived, out of five operated upon by Wyeth by amputation at the hip, suffered from a severe pyogenic infection of the wound, and the authors ingeniously suggest that this accounts for the recovery. Other statistics quoted bear out their general contention, and when considered along with the high mortality attending the operation itself, it must be admitted that a strong case is made out for seeking for some more satisfactory method of treatment. The authors are firmly convinced, and give evidence in favour of their belief, that traumatism is a most important factor in determining the growth of sarcomata, and the frequency with which recurrence takes place in the stump after amputation leads them to consider "operative traumatism" a potent factor in determining the site of recurrence. They would limit amputation to cases in which the limb has been rendered incapable of performing its function. Under other circumstances they advocate excision or resection of the growth, combined with persistent and thorough use of the X-rays, the use of certain topical applications, such as pyoktanin, or methylene-blue, and the serum and toxin treatment of Coley. They prefer to remove the tumour by "subcapsular enucleation," believing, contrary to the prevalent opinion, that sarcomata are not infiltrative, but are circumscribed and well-encapsulated growths. After thus removing the tumour, the cavity left is painted with a solution consisting of pyoktanin, 5 parts; phenol, 1 part; alcohol, 20 parts, and water to make 100 parts. Iodoform should be avoided, as it interferes with the subsequent use of the X-rays. Main reliance, however, is placed on the use of the X-rays. "The most potent single agent known against sarcomatous growth is probably the X-ray," and "there is no reason to believe that Röntgen treatment increases the tendency to metastasis." The treatment should be given daily for months, and, even after apparent cure, exposures should be made once every two to eight weeks for several years.

The authors admit that the cases in which the tumour disappears under the influence of Coley's mixed toxins, show the greatest permanence of cure, but unfortunately the constitutional effects of this treatment—violent chills, headache, high fever, sweating, and exhaustion—render it impracticable in many cases. They have observed no permanent good effects from the use of trypsin or allied ferments.

The illustrated records of cases treated by Babcock and Pfahler on these lines are most convincing, and compel attention from all who are called upon to treat sarcoma.

Bloodgood (*Journ. Am. Med. Assoc.*, N.Y., 1908, February), from a study of his own cases and those treated in Halsted's clinic at the Johns Hopkins Hospital, also adopts the conservative attitude. With regard to the more malignant forms of sarcomata occurring in the bones of the limbs, he concludes that a fatal issue usually ensues even when high amputation is performed within a few weeks of the onset of the symptoms. Death is generally due to metastasis to the lungs. He also is of opinion that amputation should only be resorted to when the necessary local resection renders the limb useless, and he is against the common practice of amputating at the highest possible level. Localised tumours of the jaws should be excised. Giant-celled sarcoma has been cured by simple curetting. In over 100 cases of the pure tumour none has given rise to metastasis. In the osteo-sarcomata, properly so called, that is periosteal tumours in which there is new bone formation, metastasis does not occur, and local resection is the operation of choice.

Coley (*Surg., Gynec., and Obst.*, Chicago, 1908, February) has himself observed, since 1890, 234 cases of sarcoma originating in bone, equal to 37 per cent. of all his cases of sarcoma. The bones most frequently the seat of sarcoma are those most exposed to external injury—femur, superior maxilla, orbit, humerus, tibia, etc. He is an adherent of the microparasitic theory of the causation of these tumours. "In no other way can one explain the development of periosteal sarcoma of the femur or humerus, immediately following an injury, with rapid generalisation through the blood vessels, causing death within a few months." He believes also that the influence of trauma can no longer be doubted. Sarcoma not infrequently occurs in persons whose relatives died of carcinoma, and the patient when attacked is usually in the most robust health. The condition that most closely resembles sarcoma of bone is tuberculosis, but the rate of growth is much greater in sarcoma, and the adjacent joint is not so early or so seriously implicated. The temperature is sometimes raised to 101°, 102°, or 103° F. Examination of the blood shows nothing characteristic. While it is always advisable to have an X-ray photograph of the tumour, in many cases nothing characteristic will be found, except in the later stages when the diagnosis is easy without the X-rays. Coley agrees with Butlin that in the early stages the photograph may actually prove misleading. While certain risks attend exploratory incisions, he is in favour of this diagnostic aid when it is necessary to enable treatment to be undertaken early. Among the other conditions with which sarcoma is liable to be mistaken, he mentions syphilitic disease, cysts of bone, inflammatory conditions, and myositis ossificans.

As regards the results of amputation, he finds that in fourteen cases of sarcoma of the femur treated by amputation at the hip, only one was cured, and without exception the deaths all occurred within a year after the operation, and there seemed to be little difference in the malignancy whether the tumour was periosteal or myeloid. The general results in tumours of other bones were little better. Stating the final results in sarcoma of the long bones, he says that ten patients have remained well over three years.

With reference to treatment by amputation, Coley remarks that in the periosteal type of sarcoma of the long bones, especially the femur and humerus, not only is the limb sacrificed, but in the great majority of cases there is failure to save the life of the patient; and he quotes Butlin to the effect that "we cannot but form the opinion that the disease is horribly and rapidly fatal, and that the prospect of complete cure, or even long immunity from recurrence, is singularly small." Summing up, Coley says that the treatment of sarcoma "forms one of the most gloomy chapters in the history of modern surgery." He then goes on to consider his own method of using mixed toxins. There are now on record thirteen cases of sarcoma in which the limb as well as the life of the patient has been saved by the use of the toxins. Of these, eight are well from four to nine years. He admits that in probably a large proportion of cases the toxins will fail to check the progress of the disease, but this will be determined in two or three weeks. If the disease is not brought under control in this time, amputation should be performed, and the use of the toxins resumed as soon as possible after the operation. In cases of myeloid sarcoma resection is the operation of choice.

He refers to forty-four cases of inoperable sarcoma in which the toxins have been used by him with success during the last fourteen years, and sixty cases recorded by other surgeons. The details of the process of making and using the toxins are given. A reliable preparation is now made according to Coley's formula by a well-known American firm of manufacturers.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

F. W. N. HAULTAIN, M.D., F.R.C.P.Ed.,

PHYSICIAN FOR DISEASES OF WOMEN, DEACONESS HOSPITAL, EDINBURGH;

AND

J. A. C. KYNOCH, M.B., F.R.C.P.Ed.,

PROFESSOR OF OBSTETRICS AND GYNÆCOLOGY, ST. ANDREWS UNIVERSITY.

Treatment of Contracted Pelvis.

Olshausen (*Berl. klin. Wchnschr.*, 1908, January) points out that the measurement of the conjugata vera is not the vital point in contracted pelvis. He describes in detail the shape of the pelvis in rickets, and in the generally contracted form. The diagnosis of the latter is more difficult than that of the rachitic or simple flattened pelvis. In the generally contracted pelvis the conjugate diameter is rarely less than 3 in. The size of the fœtal head and also the degree of hardness are important factors, which cannot, however, always be easily determined. When the os is dilated and the head lying over the inlet, the relative size of the head can be ascertained. Olshausen describes the mechanisms of labour in contracted pelvis. When the posterior part of the parietal bone presents in high degrees of flattened pelvis, one may anticipate difficulties. After describing in detail the fœtal positions in the various forms of contracted pelvis and the natural means of delivery, Olshausen discusses the treatment of pelvic contraction. With reference to weak pains, few drugs are of use to strengthen them. Ergot is only available when the head is on the pelvic floor. Quinine in doses of 5 grs. every two hours may do good. Warm baths are supposed to stimulate uterine action, but Olshausen does not consider them advisable when the os is dilated and the membranes ruptured. Placing the patient in a more favourable position often improves matters. Forceps must be used with great care, especially in cases where the head has not engaged at the inlet. If a fair trial fails to make any progress, the forceps should be removed, and perforation should be performed. Although the author does not consider version favourable for the child, it saves the maternal parts from excessive pressure.

Craniotomy is indicated when the fœtus is already dead, but should very rarely be performed on a living child. Porro's operation need no longer be considered, as the results of ordinary Cæsarean section are now so satisfactory. With regard to the various pelvis dividing operations, Olshausen does not think the technique of any of them has yet been perfected. The chief dangers are hæmorrhage-fistulæ, and tears into the vaginal walls, with general infection as a result. He believes, however, that pubiotomy will continue to be recognised as a standard obstetrical operation.

THE CÆSAREAN OPERATION IN SCHAUTA'S KLINIK.

NEUMAN (*Arch. f. Gynäk.*, Berlin, Bd. lxxxix. Heft 1) reports on 180 Cæsarean operations, of which 175 were performed on the living and five upon the dead woman. As a whole, the operation was performed in one out of every 289 cases of labour. In 171 of these cases the operation was performed for relative and in forty-seven for absolute indications. In four cases the pelvic cavity was blocked by tumours, in eight cases there was cicatricial contraction of the soft parts, and seven patients were suffering from eclampsia. Of the total, 161 recovered and fourteen died. Of the fatal cases, eight were attributable to the operation. Of the children, 145 were born living, ten died, and twenty were born asphyxiated, but recovered.

POST-MORTEM CÆSAREAN SECTION.

MÖGLICH (*München. med. Wchnschr.*, 1908, No. 4) reports the case of a woman, æt. 41, who had very severe hæmorrhage as the result of placenta prævia. Combined version was attempted, but the patient died during the operation. As the pulsation of the umbilical cord persisted, abdominal section was at once performed, and an asphyxiated but viable child extracted. Prolonged artificial respiration was successful in reviving the child, which was perfectly well five weeks later.

Superinvolution of the Uterus.

Carli (*Arch. ital. d. ginec.*, Anno x. 1–6) states that sepsis, hæmorrhage, tuberculosis, or other condition which weakens the patient favours excessive involution. Excessive after-pains also cause superinvolution, which, however, is usually a temporary condition; only occasionally does it become permanent. The treatment should be directed to improving the general health, and to local stimulation of the uterus by such irritants as carbolic acid, zinc or copper salts.

Toxæmia due to a Twisted Parovarian Cyst.

Pancot and Vauverts (*Nord. Méd.*, 1908, January 15) report the case of a woman, æt. 45, who complained of severe and sudden abdominal pain. Menstruation had been irregular, and for three weeks there had been intermittent diarrhœa, with frequent vomiting. Examination revealed a tumour in the right side of the abdomen, also felt through the right lateral fornix. Pulse, 104. At the operation the peritoneum was found healthy. A cyst was discovered with black walls and a twisted pedicle. On the third day after operation the pulse was 120, but there was no abdominal pain or distension. The patient recovered. The authors consider that the unfavourable symptoms after operation were due to absorption from gangrenous tissue in the stump of the pedicle, and not to an infection.

Renal Decapsulation for Puerperal Eclampsia.

Palgowski (*Centralbl. f. Gynäk.*, Leipzig, 1908, No. 2) reports the following case:—Patient, æt. 24, 4-para, was attacked thirteen hours after delivery with severe eclampsia. She had acute nephritis, with very marked albuminuria. The capsules of both kidneys were removed thirty-four hours after delivery. Convulsions ceased, and soon afterwards there was marked improvement in the nephritis. For six hours after the operation the patient was still comatose, but eventually recovered.

Shortening the Round Ligaments for Backward Displacements of the Uterus.

J. W. Taylor (*Birmingh. Med. Rev.*, 1908, January) gives the results of his experience in this operation, based on a series of eighty-five cases. There was no mortality, there was slight suppuration in fifteen cases operated on at the patients' own homes, and in only one case did hernia follow the operation. With six exceptions, Taylor was able to follow up all the cases, and in three only was there found any indication of a relapse. In regard to pregnancy, there had been nineteen pregnancies in fourteen of the patients, without any difficulty at the time of confinement. He describes in detail his method of operating, illustrated by six figures. The chief points are a short incision, the entire contents of the inguinal canal are raised with forceps, no aneurysm needle being used. The ligaments are carefully drawn out, and the upper angle of the pillars of the ring are closed with fine silk, which is then used as a continuous suture, passing through the pillar on one side, through the round ligament and pillar on the other side, interrupted after a few stitches in order to pass a stay suture of silkworm gut through the middle of one side of the incision, when the continuous suture is resumed. The author holds that for this operation the condition should be one of uncomplicated backward displacement. Cases causing no important symptoms are best left alone, while others following on subinvolution may be relieved by drugs and a suitable pessary.

THERAPEUTICS.

UNDER THE CHARGE OF
RALPH STOCKMAN, M.D., F.R.C.P.Ed.,
PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY;
AND
FRANCIS J. CHARTERIS, M.D.,
ASSISTANT TO THE PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY.

Treatment of Sarcoma with the Mixed Toxins of Erysipelas and Bacillus Prodigiosus.

In this paper Coley sums up his experience with this method of treatment, and records the results obtained by himself and others. The treatment, as is well known, is based upon the clinical observation that sarcomata have been known to disappear as the result of an attack of accidental erysipelas, or erysipelas produced by intentional inoculation. Coley can refer to forty-seven personal cases and nearly a hundred other cases, reported by various observers, in which the use of the mixed toxins has been followed by complete disappearance of the tumour. Definite cure (*i.e.* no recurrence of growth for upwards of three years) has been recorded in twenty-eight of his own cases and thirty of the cases published by other observers. Coley's series of twenty-eight cures includes every variety of sarcoma except melanotic, and the cure was obtained with tumours of all parts of the body. The beneficial effect is only obtained in cases of sarcoma, and not as yet in carcinomata, where, indeed, the effect of the toxins is for a time markedly inhibitory, but not permanently curative.

The treatment with the toxins may be used—(1) In inoperable cases of sarcoma; or (2) in cases involving a long bone, whose removal means the loss of a limb; or (3) after operation, as a prophylactic against a recurrence. In inoperable cases, whatever the character or situation of the sarcomatous growth, the mixed toxins should be used, as affording the best and generally the only prospect of a cure. As regards the second class of bone cases, Coley differentiates two varieties—first, those cases where the disease is so far advanced that a delay of even three or four weeks will probably make the operation impossible; and, second, that class of case in which the sacrifice of the limb can be delayed without serious risk for this period of time. In the first class, it is better not to delay the operation; but in the second class, constituting the great majority of cases involving long bones, it is best to give the patient the benefit of a trial with the mixed toxins for a period of three weeks, which will be sufficient to find out whether the toxins are likely to prove successful. If the tumour continues to increase during this period, it is not wise to prolong the treatment even as long as three weeks, but to proceed forthwith to operation, even after one week's trial, and then continue the toxins as soon as practicable as a prophylactic against recurrence, as it has been found that the number of recurrences when this plan has been adopted is surprisingly small. As some guide to the prospect of a successful use of the toxins, Coley states that he has himself treated 430 cases. In forty-seven the tumour has entirely disappeared, and of these, in twenty-eight cases a period of more than three years has elapsed without any recurrence. It appears that there is thus a very fair prospect of a permanent cure, while no case is so desperate that the toxins cannot be tried. There seems very little risk of doing damage by the use of the toxins. The preparation can be got from Parke, Davis, & Co., and is kept best in a dark glass bottle on ice. The vitality is retained for a long time, in some cases as long as eight months; but it is perhaps best to use a preparation not more than a few weeks old. In the actual treatment, a very small dose of one-fourth of a minim should be used to commence with, and the first few doses should be made into tissue remote from the tumour. This dose is gradually increased by a quarter to half a minim till a reaction is obtained. The reaction should be fairly severe, with a temperature of 102° to 104°, with or without a rigor. The more vascular the tumour, the more severe the reaction; hence use in such cases very small doses. As a rule, a reaction will be obtained before the dose of 12 minims is reached. After a few days' treatment, it is, as a rule, safe to inject directly into the tumour in quantities from a quarter to a half that required to produce the reaction when given into sound tissue. The injections should be given daily, if possible; but no injections should be given till the temperature has fallen to normal, or nearly normal. The first signs of improvement are decrease in size, marked increase in mobility, and diminution in vascularity. Hard, bony, or cartilaginous tumours tend to become softer. Improvement may occur in a few days. If no improvement is obtained in four weeks, there is little use in prolonging the treatment. The average duration of treatment in successful cases has been from two to four months. When the dose is below 2 minims the toxin should be diluted, to insure accuracy of amount. Local pain may be reduced by adding cocaine to the injection, or giving morphia.—*Boston Med. and S. Journ.*, 1908, No. 6.

Glycolytic Ferments in Human Tumours.

Odier of Geneva advocates the injection of glycolytic ferments in the treatment of malignant tumours. His method is essentially different from the use of trypsin, which acts only when brought into direct contact with the tumour. The action of glycolytic ferment is, on the other hand, not a local effect upon the tumour, but a specific general action. He explains this action as follows:—The blood in cancer is more dense than normal blood. Further, this blood, when incubated at blood heat for an hour, does not have its density reduced, as is the case with normal blood. According to Odier, this depends upon the absence or weakness of the normal glycolytic ferment in the cancerous blood; consequently the glycogen is not reduced, and the density remains high. Further, if glycolytic ferment be injected into cancerous or sarcomatous cases in a certain proportion, an immediate improvement is obtained, irrespective of the size or situation of the tumour. As yet it is impossible to classify the cases which will thus be benefited, but it is clear that the quantity of glycolytic ferment which can be introduced depends upon the malignancy of the tumour. Odier holds that cancer is not a local disease, but that the local lesion is the expression of a general diathesis. He accepts Ehrlich's view that cancer depends upon a hypothetical substance, x. For this substance Odier suggests the name cancerogen. He suggests that it is in some way bound up with, or allied to, glycogen, and that it can be destroyed by glycolytic ferments. A malignant tumour attracts to itself and fixes upon cancerogen circulating in the blood. The proportion of cancerogen present bears a relation to the malignancy of the tumours, and furnishes them with their nourishment. He considers it probable that cholesterin also plays an important part in the growth of the tumours. By some process not understood, cholesterin accumulates round the cancerous cells.

The glycolytic ferment may be prepared as follows:—A quantity of muscles, obtained from calves, young bulls, or sheep, is carefully cleaned of fat and tendons. It is then mixed with three times its weight of pancreas. Both are finely minced or pounded in a mortar, and are covered with pure sterile glycerin. The mixture is stirred with a glass rod, and kept for twenty-four hours at a temperature between 18° and 20° C. The mixture is then strained through fine muslin, and filtered thrice through thoroughly moistened filter papers, and finally passed through a Chamberland filter B. The liquid so obtained is put up in flasks containing 20 c.c. In an ordinary case 2 c.c. are injected twice weekly, while in very slowly advancing cases the frequency depends upon the individual susceptibility of the patient. The action of light appears to destroy much of the activity of the preparation. The great advantage of this treatment is that the injection can be made into any part, and acts upon a tumour situated in any region and of any size. In using these preparations, Odier advises that an arsenical preparation should be given along with it. It is of great importance not to stop the injections suddenly, as this may produce a serious catastrophe in cases where the tumour was steadily receding. The explanation probably is that, as the result of this injection, the tissues react with an antibody. This antibody is too feeble to deal with all the ferment introduced, but as soon as the extraneous administration is stopped, the antibody may be too much for the glycolytic ferment produced normally in the body. Hence, this ferment being removed, the cancerogen is not destroyed at all, and the tumour, richly supplied with nourishment, increases apace.—*Presse méd.*, Paris, 1908, No. 16.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

R. F. C. LEITH, M.B., F.R.C.P.Ed.,

PROFESSOR OF PATHOLOGY, THE UNIVERSITY, BIRMINGHAM.

Typhoid Fever—a New Bacillus.

Mandelbaum (*München. med. Wchnschr.*, 1907, September 3) describes a new bacillus isolated from typhoid fever patients. He isolated it from the stools or from the blood during life in ten cases of typical typhoid fever. He calls it a metatyphoid bacillus. Its essential character is the production of typical crystals in cultures on glycerin agar. The crystals are like those of tyrosine, and lie close to the colonies, appearing in about twenty-four hours. They are probably due to a combination of lime and an organic acid under the influence of the products secreted by the bacillus. They do not appear in mixed cultures of the Eberth and the metatyphoid bacilli. Both the typhoid and paratyphoid bacilli produce a greenish-yellow transformation in hæmoglobin in the space of twenty-four hours, whilst the metatyphoid bacillus fails to produce any change. In other characters, however, it corresponds closely with Eberth's bacillus.

Typhoid Fever: its Contagiousness.

Conradi (*Klin. Jahrb.*, 1907, tome xvii. fasc. 2) found the typhoid bacillus in the stools as early as eight and eleven days before the appearance of the first symptoms. The sick person has thus been spreading the disease even before he lies up at home or in hospital, no matter how early that may be. Conradi divides bacillary carriers into three groups—(1) Healthy people who simply carry the bacilli; (2) sick people who discharge bacilli in their excretions intermittently at intervals for about ten weeks; (3) sick people who constantly discharge bacilli. In 400 cases he found only two of the third class and twenty-two of the second, *i.e.* 5½ per cent. He gives a striking example of the third group, namely, a woman, who had typhoid in October 1903, and conveyed the disease to her servant in 1905. She had constantly, up to the time of writing, discharged typhoid bacilli. He thinks that transmission in such cases is by contact only, and that the bacillus from them could not transmit the disease through water, etc. Individual receptivity plays an important part. Conradi found that two of the people in contact with typhoid patients, though themselves to all appearance well, showed bacilli in their blood, in the one case Eberth's bacillus and in the other paratyphoid *Bacillus β*. He further isolated typhoid bacilli from the excreta of individuals long convalescent from typhoid fever, after they had been again brought into contact with typhoid fever cases, and seeks the explanation in a reinfection.

Conradi further (*Deutsche med. Wchnschr.*, Leipzig, 1907, October 10) set himself to answer the question, "At what moment does typhoid fever become infectious?" In a study of eighty-five cases in which he believed that the infection was carried by contact, he concluded that the danger of infection was greatest during the first week. At least 58 per cent. of the cases contracted the disease during the first week of the sick person's illness. He is inclined to think that a goodly proportion of this number is infected by the sick even during the incubation period, but he is quite sure that infection comes from them at a very early period, if not during the incubation period itself. The following is the analysis of his eighty-five cases, according to the time of conveyance of infection from the sick to the sound: Forty-nine cases during the first week, sixteen cases during the second, ten cases during the third, five cases during the fourth, three cases during the fifth, one during the sixth, and one during the seventh.

TYPHOID CHOLECYSTITIS AND DISSEMINATION OF TYPHOID BACILLI.

THAT the gall bladder may become inflamed under the action of the typhoid bacilli, and harbour the bacillus for long periods, is well known, but the case recorded by C. Simon (*Klin. Jahrb.*, 1907, tome xvii. fasc. 2) is unusually striking. A woman, æt. 28, was found to be suffering from empyema of the gall bladder. An operation relieved her. A number of gall stones were removed, and though she was gravely ill for several weeks after the operation, she recovered. During her illness Eberth's bacillus was isolated not only from the discharge from the biliary fistula, but also from the stools and the urine. After complete recovery she continued to discharge bacilli. They were found six times out of ten during a year. She was a chronic bacillary carrier, and, indeed, infected two other people. The history of the infection in her own case apparently dated back to her eleventh year.

SIMULTANEOUS PRESENCE OF THE TYPHOID AND PARATYPHOID BACILLUS IN WATER.

CONRADI (*Klin. Jahrb.*, 1907, tome xvii. fasc. 2) traced the source of infection in a case of typhoid fever to ice which had been taken from a certain fountain. He examined the water of the fountain bacteriologically twenty-six days after the ice had been taken, and found both the typhoid and paratyphoid bacillus present in it. At the date of its arrival at the laboratory there were 100 colonies of Eberth's bacillus for twenty to 250 of the paratyphoid bacillus. After being kept for a week in the dark, the same water gave five to ten colonies of Eberth to 100 colonies of paratyphoid, and at the end of five weeks both were found. Water taken six days and nine days later from the fountain itself did not show these germs, whereas they were still present in the basin of the fountain.

Development of the Bacillus Typhosus and Bacillus Coli in media to which various Acids have been added.

N. Paus (*Centralbl. f. Bakteriol. u. Parasitenk.*, Jena, Orig. 1, 1907, October 8) set himself, after the studies of Gaffky, Kitasato, and others, to try the effect of a large number of fatty acids upon the growth of these two germs. To 96 c.c. of bouillon he added variable quantities of acid solutions, 10 per cent. in distilled water, and then brought the total up to 100 c.c. with distilled water. He tried formic, acetic, propionic, butyric, isobutyric, lactic, oxybutyric, oxalic, succinic, malic, tartaric, amido-succinic, phosphoric, nitric, hydrochloric, and other acids, and found that the two germs grew well in a medium even rich in acid, and that generally the colon grew better than the typhoid bacillus, so much so that the former could still give a growth in a medium too acid for the latter. But that no general rule could be laid down about this with all acids, and that acids belonging to the same group were more constant in their action than those of different groups.

Myasthenia Gravis.

Chvostek (*Wien. klin. Wchnschr.*, 1908, January 9) reviews the various theories which have been put forward to explain this curious disease, and finds them all wanting. He attempts to show that defective functioning of the parathyroid glands is a more satisfactory explanation. Tetany, as is well known, is attributed to deficient action of the parathyroids, and so myasthenia gravis may be due to an opposite condition, namely, excessive or perverted functioning of these glands. The disturbance may arise owing to some change within the glands themselves, or within the nerve centres governing the glands. There is no evidence to show that the thymus gland is related in any way to myasthenia gravis.

Idiopathic Phlegmonous Gastritis.

Hosch (*Cor.-Bl. f. schweiz. Aerzte*, Basel, 1907, December 15) reports a case and its post-mortem findings. He reviews the literature of this form of primary gastritis. The disease runs its course in from one to twenty days. There is usually fever, and the general symptoms are similar to those of ulcers of the stomach wall. No cause can be named in many cases, though in some, alcoholism, trauma, dietetic errors, or poisoning has been blamed. The causal germs may reach the stomach from a carious tooth, an ulcerative stomatitis or a pharyngitis, or conveyed by the food. Their entrance into the mucous membrane of the stomach may be favoured by injury of any hard or sharp substance accidentally swallowed. It may be of pyæmic origin in tonsillitis or a boil. He thinks it is safest not to operate, because there are frequently multiple perforations, and their site cannot be known beforehand. He prefers rest of stomach, with ice and rectal alimentation, saline infusion, morphia, and stimulants. He objects to Kauber's recommendation of cautious lavage of the stomach, owing to the danger of perforation, and because of its inefficiency, the lesion being in the submucous and not the mucous coat.

THE OPHTHALMO REACTION IN TUBERCULOSIS.

A LARGE number of papers have lately appeared on this subject. The test has now been tried extensively in man and in the lower animals. In oxen, for instance, it is said to give unfailing evidence of tuberculosis when it is positive, but that its absence does not imply the absence of the disease. In a long paper, Wolff-Eisner and Teichmann (*Berl. klin. Wchnschr.*, 1908, January 13) endeavour to prove that in man, when the reaction is strong early in the disease, the prognosis is good, and bad when it is feeble or absent. A strong reaction in advanced tubercle also points to a favourable outlook. Levy (*Deutsche med. Wchnschr.*, Leipzig, 1908, January 16) finds out of forty-one tuberculous patients that 85 per cent. gave a positive reaction, out of fifty-four doubtfully tuberculous patients 60 per cent. gave a positive reaction, while in 235 non-tuberculous patients only a percentage of 2·5 was positive.

The reaction is now being tried in glanders, also with apparently good results.

DISEASES OF THE EAR, NOSE, AND THROAT.

UNDER THE CHARGE OF

P. M'BRIDE, M.D., F.R.C.P.Ed.,

CONSULTING SURGEON TO THE EAR AND THROAT DEPARTMENT, ROYAL INFIRMARY, EDINBURGH;

AND

A. LOGAN TURNER, M.D., F.R.C.S.Ed.,

SENIOR SURGEON, EAR AND THROAT DEPARTMENT, ROYAL INFIRMARY, EDINBURGH.

THIOSINAMINE IN THE TREATMENT OF ADHESIVE PROCESSES IN THE MIDDLE EAR.

FURTHER information on the use of thiosinamine in the treatment of middle-ear deafness has been furnished by Lermoyez and Maher (*Ann. d. mal. de l'oreille, etc.*, Paris, 1907, December). After reviewing the chemistry and the historical facts connected with the employment of this agent, the authors describe the technique which they have employed in connection with its use in middle-ear deafness. They have adopted the simple method by instillation in the external auditory meatus. The following solution is prepared:—Thiosinamine, 15 grms.; antipyrin, 7·5 grms.; distilled water, 100 grms. Once daily, twenty drops of the solution, warmed, are poured into the affected ear, the patient reclining upon the opposite side, and the ear bath is used in this way for ten minutes. The meatus must then be carefully dried out so as to prevent the risk of irritation to the skin. While this is done once daily by the patient, it is considered advisable that the medical attendant should see the patient twice weekly, so that he may examine the ear, and, at the same time, employ massage to the tympanum. As a rule, the authors have found that after fifteen days the hearing shows some improvement. This is especially the case where there are cicatricial adhesions following middle-ear suppuration, and where a large perforation permits of the fluid penetrating into the tympanic cavity. It is less in adhesive catarrh, or in those cases where there is no longer a perforation. Nevertheless, even in these cases improvement has been noticed. Where the bath fails, injections of the solution along the Eustachian tube are carried out. When the tube is obstructed, the bougie must be in the first place employed. The solution must be sterilised, and two or three drops used in the injection. In certain rebellious cases the combined method is employed. The duration of the treatment varies: three weeks or less, six weeks or more, followed by cessation for a time, and then another trial. In some patients considerable hyperæmia is produced, both of the tympanum, meatus, and concha of the ear, necessitating a cessation of treatment for a time. In other cases again, where suppuration has been absent for a time, recurrence of it has taken place.

From what has been said, it is evident that the class of case most suitable for this line of treatment is the post-suppurative variety and the catarrhal non-suppurative form. In otosclerosis and labyrinthine disease it is contra-indicated. Where discharge from the ear is still present, it is not advisable to commence the use of the drug. The authors' results after one year's employment of thiosinamine have been satisfactory in the majority of cases, especially if one considers how useless treatment is in cases of this kind, coupled with the fact that the method is a harmless one. It has been used in thirty cases. Unfortunately, there are details wanting in their conclusions, which detract from the value of the observations.

Orbital and Ocular Affections in connection with Diseases of the Accessory Nasal Sinuses.

The statement has sometimes been made that too little attention has been paid to affections of the nasal accessory sinuses as etiological factors in the production of orbital and ocular diseases. If we are to judge from the abundant literature of more recent times dealing with this relationship, this view can be no longer held. Indeed, a perusal of some of the papers dealing with the subject almost justifies us in making the statement that attempts are made in some cases to deduce a relationship which the clinical appearances hardly seem to support. The pendulum may swing too far in this direction. The fact remains, however, that there are many cases in which the primary affection is to be found within the nose or its sinuses, and the interest taken by the ophthalmologist to-day is apparent when we find the April number of *The Ophthalmoscope* devoted entirely to a consideration of the subject.

One of the commonest orbital complications of accessory sinus suppuration is cellulitis with abscess formation. Cases of this kind have been described as ideopathic or as resulting from syphilis and rheumatism, and the nasal condition is not investigated. St. Clair

Thomson refers to a number of these cases, and draws attention to the fact that the patients frequently deny the presence of any nasal suppuration, and further points out that the surgeon may also have some difficulty in recognising any abnormal nasal condition. It is well known that many individuals remain ignorant of the fact that they have middle-ear discharge, and deny all knowledge of it. It is true, though to a lesser extent, that patients appear to be unconscious of any abnormal nasal secretion, even of a fœtid character. The necessity, therefore, of a careful examination of the nasal chambers must be emphasised in connection with orbital abscess. In the majority of cases, the frontal sinus and the ethmoidal cells are found to be the seat of the mischief and the etiological factor in orbital abscess.

The fact that the antrum of Highmore may play a part in the production of orbital affections should not be lost sight of. Jameson Evans, in his paper in the journal above referred to, quotes an instructive case in connection with disease of the lachrymal sac. The patient had suffered for two years from a purulent dacryocystitis of the left sac. Little or no improvement had followed the ordinary treatment adopted in these cases. Excision of the sac was practised, but shortly afterwards there was again a profuse purulent discharge. The passage of a probe revealed the fact that there was a communication with the auxillary sinus. Another investigation showed that the patient suffered from an antral abscess. After this had been opened and drained, there was no further lachrymal trouble. Fish draws attention to the production of glaucoma in association with antral suppuration.

The possible association of nasal disease in cases of retrobulbar neuritis must not be lost sight of, especially when there is a unilateral or bilateral restriction of the peripheral visual fields. There are a number of recorded cases of posterior ethmoidal and sphenoidal disease in which the vision has become affected. A positive nasal finding is not always easy, and it must be remembered that the relief of the nasal condition does not necessarily lead to recovery of sight.

Blindness following Operations upon the Nose.

We read, fortunately only occasionally, of meningitis following upon intra-nasal operations. Laas reports two cases of blindness resulting from a minor operation upon the nasal cavity (*Ztschr. f. Augenh.*, 1907, August). In the first case the following operations were performed at short intervals. The tonsils were removed, and a few days later the turbinated bodies were treated. At a third operation a nasal spine was chiselled away. A quarter of an hour after this last procedure the patient complained of a glittering sensation in front of his right eye, and on testing it was found that the upper part of the observer's finger, when raised, could not be seen with the right eye. The right pupil, which was larger than the left, reacted sluggishly to light and accommodation. On the following day the right eye could only distinguish hand movements. The upper half of the field was blind. Ophthalmoscopic examination was negative. Twelve days later the optic papilla was pale. The disc became white as in total atrophy. Laas attempts to explain this case on the assumption that the chiselling of the spur on the left side of the nasal septum produced a fracture of the walls of the right optic canal, causing a partial tear of the optic nerve. Probably there were certain anatomical peculiarities which predisposed to such an accident.

In the second case, a somewhat similar operation upon the left side of the nasal septum was carried out by means of a motor-saw. When the patient opened his eyes at the conclusion of the operation, he noticed that he had become blind in the left one. On admission to hospital he had become semi-conscious, and his temperature was elevated. His neck and spine were stiff, and he passed his urine and fæces involuntarily. The left pupil did not respond to light. Lumbar puncture gave a negative result. The meningeal symptoms became aggravated, but finally disappeared. On examining the eyes at this stage, the temporal half of the left optic disc was pallid; the left pupil did not react to light, but responded to convergence. The patient was finally discharged from hospital, but the left eye remained blind. In this case Laas considered that the angle of the chiasma was wounded through fracture or fissure of the sulcus and optic canal, and thus destroying the function of the left optic nerve.

PUBLIC HEALTH.

UNDER THE CHARGE OF

J. BUCHANAN YOUNG, M.B., D.Sc. (Public Health),

ASSISTANT TO THE PROFESSOR OF PUBLIC HEALTH, UNIVERSITY OF EDINBURGH.

The Educational Method in Public Sanitation.

Dr. Charles D. Smith, President of the State Board of Health of Maine, in an address delivered to the Annual Conference of the State and Provincial Boards of Health of North America (*Journ. Am. Med. Assoc.*, vol. l. No. 2) draws attention very plainly to some of the problems which prominently engage the attention of sanitary authorities. In regard to the campaign against tuberculosis, he says: "The unparalleled interest now displayed throughout the civilised world in the prevention and restriction of tuberculosis is convincing proof that the educational method of securing results in public sanitation is producing practical results"; but, he asks, "Is there not a possible danger that the public is being over-educated; that it is being led to expect too much by a too positive affirmation of things which are not always so, and by the prediction of results which do not always arrive?" Much of such prediction may be put down to enthusiasm, but when the layman is assured that all cases of tuberculosis can be cured by the erection and maintenance of sanatoria, etc. etc., Dr. Smith thinks "it may be well to be apprehensive lest there be sometime an unpleasant reaction, with loss of interest and lack of confidence and support." He makes this suggestion, not with the idea of relaxing the vigour of the campaign against tuberculosis, but lest the popular mind should forget that there are other diseases, the importance of which may be dwarfed by the popular interest in tuberculosis. Typhoid, diphtheria, scarlet fever, etc., leave people, he says, "just as dead as tuberculosis, although not so many of them." These diseases, when epidemic, cause vastly greater disturbance of the social equilibrium. Why should not some of the same kind of education as we are applying in the cases of tuberculosis be tried in combating these diseases? The obligation of sanitary authorities to the public is to see that "none of their duties be overshadowed, and no impression should be allowed that any part of sanitary work can be advantageously ignored or neglected," and care is needed "lest they magnify too much some of their duties at the expense of others which are more commonplace."

Disinfection of Books, Furs, etc., by Hot Air.

Findel (*Ztschr. f. Hyg.*, Leipzig, Bd. lvii.) gives the result of experiments he has made with hot air as a disinfectant for books, furs, etc. Lately, on the suggestion of Flügge, Mosebach made some experiments in disinfecting books with hot air at a temperature of between 75° and 80° C.—the books being exposed to that temperature for from sixteen to twenty-four hours. This was shown to be efficient as regards *S. pyogenes*, *B. typhosus*, and *B. diphtheriæ*, with which the books had been infected. Findel wished to determine the efficiency of such a disinfecting method for *B. tuberculosis*. Sputum, containing tubercle bacilli, was spread in thin layers on the leaves of the books. The books required an exposure of at least twenty-four hours to a temperature of 75° C. (the air having from 25 to 30 per cent. of relative humidity) to ensure the killing of the tubercle bacilli. The books were uninjured by this exposure. Schumburg proposed to disinfect leather articles by hot air. He stated that they would not be injured by an exposure of from six to eight hours to hot air at 100° C., provided the relative humidity of that air was kept at from 55 to 65 per cent. It is difficult to attain this condition of humidity, and Findel considers that it is more practical to disinfect leather articles in hot air between 75° and 80° C., the relative humidity of which is often about 7 or 8 per cent. and never over 30 per cent. Boots and leather breeches have withstood without injury such a temperature for forty-eight hours, and, in general, the disinfection would be effected within twenty-four hours. The method is slow, but it is of importance that, while it is efficient in regard to the destruction of the ordinary pathogenic organisms already mentioned, it does not injure the leather. Findel has applied the same method to the disinfection of furs, without damaging them in any way, and it is stated that various rubber articles have also been disinfected without injury.

SURVIVAL OF PATHOGENIC ORGANISMS IN BREAD AFTER BAKING.

ROUSSEL (*Ann. d'hyg.*, Paris, 1907, p. 443, and *Rev. de l'Intendance Militaire*, tome xx. part 2) gives some interesting observations as to the temperatures attained in different parts of loaves while being baked in the oven. Experiments have previously been made by several observers with varying results. Roussel did not use thermometers for the work, but employed chemical substances whose fusing points have been carefully determined. The test substances were distributed in four-pound loaves, known as "Boulots." In these the temperatures attained varied from 90° to 115° C. in the soft crumb, and from 100° to 180° C. in the crust. Thirty-five experiments gave temperatures varying from 101° to 103° C. for the crumb, and from 125° to 145° C. for the crust. These results agree with those obtained by Balland under conditions of great precision. These temperatures are high, but, of course, no indication is given of the length of time for which such temperatures were maintained. As the killing of micro-organisms by heat is a product of the temperature and the duration of exposure to that temperature, it is hardly astonishing to find that, when tested by actual bacteriological experiment, baking of bread in the ordinary way was found insufficient to kill tubercle bacilli which were introduced into the loaves prior to being put in the oven. Cultures of virulent tubercle bacilli were introduced in a special manner into loaves just before placing in the oven, and after ordinary baking were re-inoculated on glycerinated media, and later injected into guinea-pigs. The subsequent death and examination of the animals so injected proved the persistence of the virulence of the bacilli. The author concludes that the cooking therefore had been insufficient to destroy the organisms. Contaminated dough therefore gives, or may give, a contaminated loaf, and the only remedy is the exclusive use of mechanical processes in the bakehouse so as to prevent contamination of the dough. It should be noted that an important factor in the sterilisation of bread in the oven is the acidity of the dough.

DISINFECTION OF ROOMS, ETC., BY "AUTANE."

ONE of the great objections to disinfection of rooms by formaldehyde vapour, according to Flügge's method, is that a special apparatus is necessary, and in spite of efforts to simplify the technique it still remains rather complicated. Last year Eichengrünn made known in the *Ztschr. f. angen. Chem.*, a new product, to which he gave the name of "Autane," consisting of a mixture of peroxide of barium or strontium, with paraformol or trioxymethylene. This mixture, inert in the dry state, gives off, in the presence of water, vapour of formaldehyde and water vapour. At ordinary temperature a relatively small quantity of water gives a slow and continued disengagement of formaldehyde vapour. If tepid water is used, the vapour is disengaged much more rapidly, and is diffused at once in the atmosphere. It is a catalytic action, the alkaline peroxide in the nascent state depolymerising the trioxymethlyene into formaldehyde, which in part dissolves, and is in part disengaged in the gaseous state. The efficiency of this substance as a disinfectant has been favourably reported on by several workers, including Wesenberg, Selter, Nieter, and Tomarkin and Heller. Fornario (*Rev. d'hyg.*, Paris, tome xxx. No. 1) gives the results obtained by him in some experiments made by him at the Pasteur Institute, Lille. He conducted his experiments in an apartment of 60 cubic metres (over 2000 cubic feet), which was not air-tight. He used for this room 2400 grms. of autane powder and about 2300 c.c. of water from 20° to 25° C., in order to assure the slow development of the vapour, the process of disinfection taking seven hours. Previous observers, with the exception of Nieter, consider that complete and careful shutting up of the chinks, windows, doors, keyholes, etc., is unnecessary, but Fornario found that disinfection was much more complete when the apartment was practically hermetically closed. He also differs from them in this, that whereas they attribute to the gas generated from autane a considerable power of penetration, his experiments show that it does not penetrate well, *i.e.* that it is a good surface disinfectant only. The ease with which it can be employed, without special apparatus, renders its use convenient for the rapid disinfection of small apartments, conveyances, railway carriages, consulting rooms, etc.

Influence of Automobilism in General Nutrition.

Mouneyrat, in a note presented to the Académie des sciences (*Bull. Acad. de méd.*, Paris, 1907, p. 539) gives the results of his investigations as to the effect of motoring on general nutrition, both in normal and neurasthenic subjects. He counted the red blood corpuscles, and estimated the amount of hæmoglobin. He also determined the principal constituents of the urine. By motoring he finds that the red blood corpuscles are markedly increased, both in normal and anæmic people. In the case of the latter it looks as if motoring at moderate speed were almost a specific. The examination of the urine also indicates increased activity of nutritive processes, which accords with the increase in appetite produced. The influence of motoring on sleep is remarkable, the sleep in the normal person becoming deeper and more prolonged. In the neurasthenic it quickly cures insomnia. This effect does not seem to be due to the fatigue, the cold air, or the more rapid aeration of the respiratory passages. The author considers that rest in the country produces the same effect more slowly, and that the air, and especially the air of fields and woods, apart from constituents already determined, contains a special principle, as yet unrecognised, which produces the sleep by acting on the nervous system.

REPORTS OF THE MEDICAL SOCIETIES.

Glasgow Medico-Chirurgical Society.—*April* 3, 1908.—Dr. Walker Downie, President, in the chair.—The meeting took the form of a demonstration of children's diseases. A case of congenital heart disease was shown by Dr. Ness.—Dr. Ness showed one case and Dr. T. K. Monro two cases of cerebral diplegia, and Dr. Leonard Findlay related the pathological findings in another case. The opinion expressed was that these cases were more commonly due to early degeneration or lack of development than to birth injuries. Dr. Findlay found an absence of the ganglionic nerve cells of the cerebral cortex and slight descending degeneration. The anterior horns also showed shrinking.—Dr. Ness showed two cases of pseudo-hypertrophic paralysis. Three cases of cretinism were shown, one by Dr. Ness, the others by Dr. M'Kenzie Anderson. Improvement under thyroid treatment was a feature common to all.—Dr. Henry Rutherford showed a child upon whom he had operated at the age of 4 months for an irreducible intussusception which had been present for at least four days. It was of the ileo-cæcal variety, and resisted all attempts at reduction. A lateral anastomosis (ileum to transverse colon) was performed, the child did well, and the tumour has not since been palpable.—Dr. Archibald Young showed a child, æt. 3 years, with marked hydrocephalus. At the age of 6 days he had operated for spina bifida, and no abnormality of the head was then noted. The head was noticed to be larger at the end of the first year, and continued to increase, but during the past year has scarcely altered. The child is beginning to walk, can speak, and is quite clear mentally. The anterior foramen is still open.—Dr. Walker Downie showed a child, æt. 3 years, with an enlarged retro-pharyngeal gland. He believed this condition to be more frequently the cause of retro-pharyngeal abscess than spinal caries. He advocates removal through the mouth, and even when abscess had formed he opened through the mouth, scraped, and got good results.—Dr. Alexander M'Lennan showed two cases operated upon for webbed fingers. The results were very good.—Dr. Edward Wright showed a boy, æt. 8 years, with a large amyloid liver.—Drs. W. K. Hunter, Henry Rutherford, Alexander M'Lennan, and H. E. Jones showed various specimens and photographs.

Forfarshire Medical Association.—*April* 3.—Dr. Constable of Leuchars in the chair.—Mr. Greig showed a case of sporadic cretinism in a female, æt. 11 years. The case was a typical one, and presented that peculiar and characteristic physiognomy of apathy, with heavy stunted body, bent limbs, and awkward waddling gait. The head was unusually well covered with hair, and there were well-marked supraclavicular pads. He also showed a woman after two operations of partial craniectomy for syphilitic osteitis, who suffered before operation from exceptionally severe headache, evidently caused by the pressure of the thickened bone, the removal of which gave relief. The pieces of bone removed and stereoscopic photographs of the patient before and after operation were exhibited. He then showed two cases after nerve suture. The first after primary suture of the median nerve, cut at the wrist, and the other after secondary suture of the ulnar nerve, cut at the elbow.—Dr. M'Gillivary showed a man who, while at work in a foundry, received an injury to his eye, causing a punctured wound of the cornea which produced a traumatic cataract. When the lens was removed it was seen that the foreign body, a small piece of steel, was implanted in the optic disc.—Dr. Don showed a case of early aortic aneurysm with an X-rays photo of the condition.—Dr. Foggie showed a boy with a patch of favus in the right axilla. There was no sign of the disease on the head, or any other part of the body.—Mr. Greig exhibited a pelvis from an adult female showing double congenital dislocation of the hip. Many years ago the case had been diagnosed as osteo-malacia, and had been treated by removal of the ovaries. This was in pre-X-ray days, with whose advent the true condition of affairs was discovered. He also exhibited a skull with synostosis between the atlas and the basi-occipital.—Dr. M'Gillivary showed a specimen of an enucleated eye after penetration by a lead pellet, which was implanted in the intravaginal sheath of the optic nerve just behind the eyeball.—Dr. Kerr showed a heart with congenital malformation, from a child, æt. 12 weeks.—Dr. R. C. Buist showed a liver showing acute yellow atrophy from a case of eclampsia.—Dr. Pirie showed radiograms from a case of œsophageal stricture caused by an intrathoracic tumour. The condition was demonstrated after the patient had partaken of a meal containing bismuth.—Professor Weymouth-Reid gave a demonstration of colour photography as applied to medicine.

ANALYTICAL REPORTS.

Messrs. Parke, Davis, & Co.'s Preparations.

Egmol.—This new cod-liver oil substitute is an emulsion of olive oil made with fresh eggs and flavoured with brandy. It is stated to contain 40 per cent. of the finest olive oil, and has a not unpleasant flavour, remotely reminiscent of salad dressing. Owing to the amount of assimilable fat it contains, it must possess considerable nutritive value, and is certainly worthy of trial in cases in which there is repugnance to cod-liver oil.

Petroleum Emulsion.—Although petroleum is destitute of nutritive value, and presumably has no further pharmacological action than that of mechanically soothing the mucous membranes with which it comes in contact, petroleum emulsion appears to continue in demand, and must therefore have been found useful in catarrhal conditions generally. It is obviously desirable that the petroleum used should be absolutely pure, and this is supplied by Messrs. Parke, Davis, & Co. in their emulsion, which is made from pure liquid paraffin, freed from the impurities caused by imperfect refinement. They add to the emulsion hypophosphite of sodium and calcium.

Adrenalin and Chloretone Ointment.—Chloretone is one of the newer antiseptics and analgesics introduced by the same firm, and when incorporated in an ointment with adrenalin may advantageously be used in cases of indolent inflammation, piles, pruritus, eczema, etc. The ointment contains $\frac{1}{10}$ per cent. of adrenalin and 5 per cent. of chloretone; it is supplied in collapsible tubes, which facilitate its cleanly application.

Cholelith Pills.—Under this name the makers have introduced a pill containing sodium salicylate, phenophthalein, acid sodium oleate, and menthol. It is stated that this combination of drugs has proved effective in conditions of biliary stasis, and has marked power of increasing the flow of bile, and of promoting the excretion of bile acids, thus favouring the solution of concretions.

Black-wash Tablets.—One of these tablets, rubbed up with $\frac{1}{2}$ oz. of glycerin, and dissolved in 10 oz. of water, produces the lotio hydrargyri nigra of the British Pharmacopœia. The tablets furnish the remedy in a portable convenient form, and cannot fail to be useful in many circumstances.

Analgesic Balm.—Under this name Messrs. Parke, Davis, & Co. supply an ointment consisting of methyl salicylate, menthol, and lanoline, designed for the treatment of arthritic and painful affections generally. It may be used in neuralgia, in headaches, and even in bruises and sprains, provided the skin be intact. The balm is a mild counter-irritant as well as analgesic. It is issued in collapsible tubes, which ensure cleanliness and prevent waste.

Aloin and Phenophthalein Compound.—Judging from the number of guises under which it is put on the market, phenophthalein has secured a footing as a popular cathartic. In these elegant gelatine-coated pills it is combined with aloin, strychnine, belladonna, and ipecacuanha; and it is claimed, we believe with justice, that the result is an effective combination in the treatment of chronic constipation, torpidity of the liver, and kindred disorders.

Synthetic Camphor.

(A. & M. Zimmermann, 3 Lloyd's Avenue, London.)

Messrs. Zimmermann have submitted to us a sample of chemically pure synthetic camphor from the laboratories of E. Schering. Its pharmacology has been investigated by Langaard, with the result that in its action on the respiration, the heart, and the nervous system, it is identical with the natural product. In therapeutics, according to Professor Grawitz, it differs in no respect from ordinary camphor, while the report of the German Imperial Government runs to the effect that, but for a slight difference in optical properties, it is physically and chemically indistinguishable from natural camphor, over which, moreover, it has an advantage in point of price.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL.

Edinburgh Medical Journal.

THE next number of the Journal will bear on the title-page that along with it there has been incorporated the *Scottish Medical and Surgical Journal.* There is no need to recall the circumstances which led to the publication in Edinburgh of two medical journals; the essential object which was aimed at from the outset by both parties, that whatever Journal was published, it should be in the hands of the medical profession, has now been fulfilled, and it is a matter for congratulation that an amalgamation of the Journals has been accomplished under the most friendly auspices. The *Edinburgh Medical* will be the title of the new Journal, this having been jointly agreed upon, partly because of the greater age of the periodical bearing that name,—it having celebrated its centenary a few years ago,—and partly because it seemed undesirable to interrupt the continuity of references in medical literature which that long-continued history implies.

The representatives of the *Edinburgh Journal* have to gratefully acknowledge the courtesy and good feeling shown them by those representing the *Scottish Journal*, and to the Chairman, Mr. Joseph Bell, their thanks are especially due. May the new periodical maintain and carry on the best traditions of Medical Journalism in Scotland, and may it be found worthy of gaining the support and goodwill of the medical profession north of the Tweed, and of Scottish graduates in all parts of the Empire!

Medical Certificates in Lunacy.

WE have received from the Medical Defence Union of Scotland a copy of a form of indemnification proposed by them for the protection of doctors signing lunacy certificates. The form, which appears to be comprehensive, is drawn up in legal terms, and is intended to be signed by the relatives or other persons at whose instance the medical man is requested to act in such cases. It is undoubtedly right that the members of our profession should protect themselves by every means from the consequences of the onerous duty of certifying away the liberty of a fellow-citizen, and we welcome this form as an additional safeguard. It cannot, however, be regarded as of more than partial value. In the great majority of instances the relatives are not in a financial position to undertake such an obligation, and in the cases in which they are rich enough to bear the burden, an action at law for wrongous certification is most unlikely to be raised. Those who know about asylums and their inmates know that threats of legal proceedings for alleged wrongous certification or unjust detention are daily uttered by scores of patients in asylums. In the great majority of cases they are merely stereotyped, meaningless phrases, but in a few instances they are the outcome of a strenuous determination to be avenged upon society in one way or another. It is not very generally known that patients labouring under certain forms of mental aberration are, as a rule, more vindictive and dangerous than others. There is a type of person with an ill-balanced mind and subject to vague delusions of persecution who are most liable to resort to extreme measures, either legal or physical, in their desire for notoriety or revenge. Such people hover on the borderland, at times manifestly insane but often so sane as to appeal strongly to the sympathies of the uninitiated layman. With such people it is always dangerous to meddle, and in our dealings with them we ought to take advantage of every precaution that offers. On the other hand, the majority of persons who are certified and confined on account of some regular form of acute insanity never entertain the thought of raising actions at law. There are several reasons why lawsuits under the Lunacy Acts are so few. Many of the would-be litigants are so insane that no agent or counsel could seriously plead their cause; some patients recover sufficiently to be able to recognise the justice of their certification and detention; while in many instances the patient or his relatives shrink from the publicity involved. One of the greatest safeguards of the medical profession in this connection is that by the law of Scotland such actions can only be raised before a judge sitting without a jury. Such a provision reduces considerably the prospects of the speculative lawyer, whose client is not possessed of means sufficient to finance the initial expenses of an action in the Court of Session. It is probably owing to this provision, coupled with the other reasons we have mentioned, that there has only been one action of this kind in Scotland during the long period of forty years. We have no desire to minimise the risks run by medical men acting under the lunacy laws; they undoubtedly exist, and have all along existed. It may, however, be pointed out that much more serious risks are run every day by the general practitioner and the surgeon, as exemplified by a recent notorious case twice tried in the English Courts, each time before a jury.

The indemnification form issued by the Scottish Medical

Defence Union is undoubtedly a valuable suggestion, and every medical man should provide himself with copies, but its application is necessarily limited. A survey of fifty years of lunacy administration in Scotland is sufficient to convince any one that the chances against the raising of such actions are many thousands to one.

Deaths from Anæsthetics.

A GREAT deal of attention has lately been devoted to this subject, largely we believe owing to the publicity given by a certain section of the press to reports of inquests, and also, in some measure, to the persistent manner in which anæsthetists and others magnify the risks of anæsthesia unless the drug is administered by one of themselves or in a special apparatus. As regards the prominence given in some of the daily papers to accounts of inquests on these unfortunate cases, while this may suit the popular appetite for sensationalism, we cannot believe that it serves any useful purpose. Indeed, in our opinion, it serves only to create a feeling of alarm amongst those who may have to undergo an operation, however simple, and thereby, at any rate in certain cases, increases the small although undoubted risks attendant upon general anæsthesia.

No sensible medical man wishes for a moment to underestimate such danger as exists, and we believe that throughout the profession at the present time the administration of anæsthetics is performed with due knowledge and regard to the possibility of serious consequences. When unfortunately a death does occur, it comes to be a question whether the best interests of the community are promoted by the holding of a public inquest by a coroner, who has little if any special knowledge in regard to the subject of inquiry, and by a jury of tradesmen to whom a death during anæsthesia will always be a death due to anæsthesia, and who are quite incapable of deciding whether or not any blame attaches to the administrator. We are far from suggesting that such cases should not be made the subject of full inquiry; they ought to be; but we very much deprecate that such inquiries should be conducted in public and by a body of men who are unable to appreciate the questions involved.

In Scotland, all cases of death under anæsthetics are investigated by an independent medical man, that is, one who has had no previous connection with the case. He is ordered to make full inquiry into the circumstances, as regards the necessity for the administration of an anæsthetic, and the precautions observed before, during, and after the administration; and if there is any doubt in his mind as to either the cause of death or the responsibility of those concerned in the administration, he is directed to make a post-mortem examination. His report is then transmitted to the procurator-fiscal, who considers it along with the statements of other witnesses, and finally sends the evidence to Crown counsel, with whom the ultimate decision rests as to the culpability of the parties concerned. We submit that the Scottish method of procedure effects as thoroughly and more advantageously, so far as the public interests are concerned, all that is secured by the coroner's inquest.

What after all is gained by a public inquiry except publicity? There is no greater likelihood of justly apportioning blame by it than by the procedure in vogue in Scotland. We say justly apportioning blame advisedly, because one great disadvantage of the coroner's inquest is the fact that, without any real evidence to support it, the public often receive the impression that medical men have been to blame, and that the deaths were due to a want of care or some omission on their part. This is most unjust, but we fear that it is a view which, to judge from the opinions expressed by certain anæsthetists, is also held by them.

Before a medical man can be held responsible for a death occurring during the administration of an anæsthetic, it must be proved, in the first place, that death was due to the anæsthetic; and, secondly, that there was a want of reasonable skill, care, and attention on his part. As regards the proof that death was due to the anæsthetic, this, in the majority of cases, is quite impossible to obtain from a dissection of the body. There are no post-mortem appearances pathognomic of death from chloroform. The odour of the drug in the organs of the body signifies nothing except that chloroform has been inhaled shortly before death, a fact which in such cases is not in dispute. Nor can a chemical analysis enable us to conclude that an overdose has been administered.

The post-mortem examination, therefore, can only enable us to state that death was *in all probability* due to the anæsthetic if no other condition sufficient to account for death is found; or one may, by finding a definite cause of death, such as a foreign body in the air passages, be enabled absolutely to negative the suspicion.

Since the post-mortem examination can give little assistance in fixing responsibility for the death upon the medical man, we have to fall back upon the evidence afforded by the circumstances of the case. Do they show a want of reasonable skill, care, and attention? Looking to the fact that there is no pathological condition capable of diagnosis during life which is held by the best authorities absolutely to contra-indicate the administration of a general anæsthetic, if the circumstances require it, and that if a medical man exercises the ordinary precautions of giving the anæsthetic with the patient in a suitable position and suitably prepared, and if, moreover, he can show that he supervised the administration of the drug and was prepared for eventualities with the means of resuscitation, no charge of malpraxis can possibly under these circumstances be preferred against him.

Should, however, any of the ordinary precautions have been omitted, then the question of responsibility may arise. The charge of malpraxis can practically only be proved by the attendant circumstances, and we therefore repeat that in our opinion the procedure adopted in Scotland in connection with such cases is as efficient and is more satisfactory than the method of public inquiry by coroner's inquest. In all deaths under anæsthesia there should be a careful pathological examination, with the object of collecting evidence which may help to disclose the reason why some patients die, why again some persons are apparently predisposed to suffer from the effects, and many other questions of scientific interest and practical importance.

The dissection, solely for medico-legal purposes, is, as we have stated, of little use, and can never by itself afford grounds for fixing responsibility for a death under anæsthetics upon the administrator.

The late Professor Schrötter.

The sudden death of Professor Schrötter, Ritter von Cristelli, which occurred at Vienna on the 21st April, has robbed the world of a distinguished physician and large-hearted citizen. Although in his seventy-first year, Professor Schrötter was essentially youthful. It is little more than twelve months since the writer enjoyed repeatedly long walks with him around Vienna and among the hills of the Wiener-Wald. The septuagenarian climbed the slopes with light step. Years had not dispelled his physical and mental keenness.

To succeeding bands of students from these islands, von Schrötter's name is perhaps most familiar as the foremost laryngologist of the Allgemeines Krankenhaus. "Also, meine Herren, haben sie gut gesehen?" To how many do these words recall the slight, lithe figure, friendly countenance, and alert expression of the master, as he wandered through his immense Throat Klinik. In this department, his experience and technical skill were unrivalled. His work on stenosis of the larynx and trachea is monumental. As a laryngologist, he was summoned from Vienna all over Europe and to far Siberia. It was as a laryngologist that he was consulted by the late Emperor Frederick of Germany during his last illness. How picturesquely von Schrötter would tell to a confidential friend the trying incidents of that tragic time, when it fell to him to give the gloomiest prognosis to the dying monarch and the Royal widow that was to be.

But von Schrötter was much more than a laryngologist. Of scientific stock—his father a renowned chemist—he early came under Skoda's influence. Of Skoda he spoke with supreme reverence. To Skoda he traced the irrepressible desire, which outlived his world-wide fame as a laryngologist, to become a physician in the larger sense. It was this that led him finally to divorce himself from the more restricted sphere of the Throat Klinik, and become head of the III. Klinik of Internal Medicine in the General Hospital.

As a physician, his methods were clear, direct, and sure. It was an intellectual treat to listen to his graphic, artistic description of the salient points of a difficult case.

For many years he devoted himself with unbounded energy and self-sacrifice to the solution of the tuberculosis problem. He became the leader of the anti-tuberculosis movement in his own country, and was one of the best known members of the international crusade. He was the pioneer of the sanatorium movement in Austria, and actual founder of the great Sanatorium of Alland for poorer Austrian citizens,—one of the best equipped of its kind in the world. He was unanimously appointed President of the International Conference on Tuberculosis which met in Vienna last autumn. He took a large and hopeful view of the situation and outlook in relation to the prevention and extinction of tuberculosis. He was a clear and firm exponent of compulsory notification. One of his last papers communicated to the Sixth International Conference (September 1907) and published in its *Transactions* was devoted to an advocacy of notification. It contains a telling argument in its favour, and is an excellent example of von Schrötter's lucid thought and trenchant expression.

When the invitation to meet in America this autumn was conveyed to the Conference in Vienna last September, the old campaigner rose at once to his feet with the words: "Das Wort Amerika, eine Reise nach Amerika,—wessen Herz würde da nicht aufgehen, welche Beine möchten dieser Einladung nicht gerne folgen? Gewiss, wir alle werden diese Einladung mit der allergrössten Wärme und Sympathie aufnehmen."

In correspondence throughout the winter, he spoke again and again of the splendid possibilities of the meeting—the renewal of old friendships, the sight of new lands and peoples, and a grand united movement forward. But for the light-hearted veteran, the voyage he dreamed of was not to be. To one who met him in Paris in 1905, and remarked, "You look as young and as well as ever," his reply was, "No, I shall live for one year, and I may live for two and perhaps three years, but I do not think more." His physician's instinct was right.

Happy in his life, happy in the manner of his departure, honoured by his fellows, and surely beloved of Heaven, Schrötter has died young.

Medical Students and the Territorial Army.

THE cartoon, "Working and Shirking," in which *Punch* hits off, as it so often does, a topic of the day, will not, we trust, be applicable to the students of our University, whom Mr. Haldane, in his double capacity of Lord Rector and Secretary of State for War, addressed last week on the subject of a "New Reserve of Officers." It is fitting that University men, with their higher education, should be utilised for the defence of the country, and it is another evidence of Mr. Haldane's thinking that he should have formulated a scheme to attract them to the army. It may be grandiloquency to say that the great units of the army are to be dominated by mind and thought and not by brute force, but it is nevertheless the right idea. Armies do not win battles by courage alone; an army by skill may be out-manœuvred as Napoleon out-manœuvred Mack at Ulm, and be defeated without a shot being fired. Napoleon said, "I have destroyed the enemy merely by marching." For this brains are needed, not only in the highest commands but in all officers, even those responsible for the smallest units. Mr. Haldane wishes the boys at our public schools to begin their training, which will be continued at the universities, so that a reserve of officers may be got to assist those of the regular army, and in time of war constitute a reserve from which competent men may be drawn to fill the depleted ranks. It is a splendid scheme, which must be welcomed by all patriotic men, and should stimulate students to take an interest in army affairs. As it is sketched by the Secretary of State, the call upon their time does not seem too great, and the suggested emoluments ought to be an inducement. Scottish students are hard-working, and not overburdened with money, but their work will not be interfered with to any extent, and their pockets will not be taxed. In the past the University Corps, Artillery and Medical, not to forget the Rifles, have been full of *esprit de corps*, and in the future we believe those who enter the *new profession* under the General Staff will emulate their predecessors.

We are naturally interested in the medical side of the army, and we know how much has been done already to enlist civilian doctors for work in the Territorial Army. Mr. Haldane takes a wide view of every department, and the short address to the nurses in the Royal Infirmary is another example of his power over detail. He spoke most appreciatively of nurses and their profession, and referred to the reserve of nurses which was being formed. The dedicated life is still the basis of his enthusiasm. Will the Nation homologate his views; will it work and not shirk?

Retirement of Professor Crum Brown.

At the last meeting of the University Court the resignation of Professor Crum Brown was received, and with his retirement there will disappear one of the most popular figures in the University of Edinburgh. During the long period of forty years he has occupied the Chair of Chemistry, having succeeded to it in 1869 when Dr. Playfair was elected member of Parliament to represent the Universities of Edinburgh and St. Andrews.

The present is not the time to review the history of the Chair of Chemistry during his long tenure, nor do we feel ourselves competent to undertake the task. There is, however, one aspect of Professor Crum Brown's academic career which is within the knowledge of every one of the many thousand students he has taught, and that is his kindness of heart, his never-failing courtesy, and his unselfish devotion in all matters affecting the lighter side as well as the more serious vein of student life. We are glad to believe that the University will not be a loser in this respect, since Dr. Crum Brown is still in vigorous health, which we trust will for many years enable him to enjoy a well-earned rest from official duties.

The First International Laryngological Congress.

It was in every way appropriate that the first International Congress of Laryngology should be held in Vienna, where fifty years ago Professors Türck and Czermak laid the foundations of laryngological science by introducing the clinical application of the laryngoscope. The Congress, which assembled under the presidency of Professor Chiari, was eminently successful from every point of view; the attendance of eminent members of the specialty was large, there being thirteen from the British Isles. No effort was spared on the part of those in authority in Vienna to make the visit of the guests enjoyable. One of the most notable features of the meeting was the reception in the Volkshalle of the Rathhaus, where the music was provided by an amateur orchestra of physicians. Among the exhibits were a number of the original laryngological instruments devised and used by Czermak.

A gloom was cast over the Congress by the sudden and unexpected death of Professor Schrötter; he had welcomed the members of the Congress in an eloquent oration, and within an hour of bidding good-bye to a large party he had entertained to dinner he passed away.

ORIGINAL COMMUNICATIONS.

THE RADICAL CURE OF FEMORAL HERNIA.

By William H. Battle, F.R.C.S., *Surgeon to St. Thomas's Hospital, London.*

The methods employed, or which have been invented, with the object of effecting a radical cure in femoral hernia, are not only very numerous, but extremely diversified. The ingenuity of the authors of these methods is an expression of the surgical activity of the day, but it also forms a comment on the want of success experienced by those who have to deal with these cases in any numbers. It is now several years (1899) since I performed an operation which, so far as I was aware, differed in principle from others which preceded it, and in my own opinion offered a prospect of success greater than that obtained by any of the methods then advocated or practised in this country. It is due to the profession that the author of any new surgical procedure shall justify it, when experience warrants this, or, on the other hand, show reason why it has failed to effect the good result foreshadowed at its inception. The methods which have been employed are, as I have said, numerous, and it would not be of very great benefit to anyone if I were to give them all in detail, but some reference is required, however brief, to the principal ones.

In all it is important to close the neck of the sack (shutting off the peritoneal cavity), and reduce this again into the abdomen after clearing it out of the canal. This is not sufficient, however, to ensure a radical cure in a femoral any more than it is in an inguinal hernia: it renders the peritoneum more or less flush on the abdominal aspect, but does not prevent the formation and descent of another sac, if no means are taken to close the passage through which it had come. The original cause of the hernia is not the formation of a peritoneal pouch, that is secondary to other things. I think that far too much has been made of the method of treatment of the hernial sac in suggestions for radical cure, so that occasionally too little attention has been given to the management of the fibrous structures which surround the canal in cases of femoral hernia. If the sac be pulled down and ligatured as high up as possible, there will be no depression left on the abdominal surface when it returns to its proper position.

After the somewhat varied treatment of the sac (which we may omit), many methods have been invented to close the femoral ring or canal.

(*A*) By Means of Sutures.—1. *Wood.*—Probably one of the first of them was the method of John Wood. "A curved needle in a handle is forced through the pubic portion of the fascia lata, just internally to the femoral vein, which is carefully protected by the finger. The point of the needle is then carried upwards and forwards, across the crural canal, and is made to penetrate Poupart's ligament, and then brought out at the upper end of the wound. It is then threaded and withdrawn. Having been freed from the ligature, the needle is then passed again through the pubic portion of the fascia lata in a direction inwards and forwards so as to skirt the border of Gimbernat's ligament, and again penetrate Poupart's ligament and appear in the wound. The upper end of the ligature is next passed through the eye of the needle, which is then withdrawn. The two ends are then tied firmly in a reef knot. The result is to close the ring by the approximation of the inner end of Poupart's ligament to the pubic portion of the fascia lata."

2. *Bassini.*—Here interrupted sutures are passed, the first three through Poupart's ligament and the pectineal fascia. These are left untied until three or four more have been passed to unite the falciform ligament to the pectineal fascia, the lowermost being put close in to the saphena vein.

3. *Lockwood.*—In this operation the sutures are passed through Cooper's ligament, commencing to the outer edge of Gimbernat's ligament, taking up some of the pectineal fascia. The outer suture lies at the inner edge of the common femoral vein. Two to five sutures will be required. The upper ends of the sutures are passed through Hey's ligament close to its junction with Poupart's ligament, and then tied.

4. *Kocher.*—Here the inner part of Poupart's ligament is stitched to Cooper's ligament and the pectineal fascia and muscle. De Gamo's method of operation after closure of the sac is hardly to be told from this.

5. *Cushing, Curtis, Coley.*—The purse-string method, as this is called, differs in principle very little from that of John Wood, as described above, with the exception that a kangaroo tendon suture is used, and it is passed through the fibrous septum to inner side of vein. "This stitch is introduced through Poupart's ligament near its inner end, then through the pectineus fascia and muscle, the fibrous septum of the femoral sheath, internal to the femoral vein, and afterwards through Poupart's ligament about a quarter of an inch from the point of entry. This suture can be passed more safely in the opposite direction, the femoral vein being more easily avoided."[1]

6. *Nicoll.*—The sac being treated in a special manner, an incision is made from the femoral vein to Gimbernat's ligament through the pectineal fascia and periosteum just below the ileo pectineal line, exposing the horizontal ramus of the pubis. Two drill holes are now made in the bone, one near Gimbernat's ligament, and the other near the femoral vein; they are about $\frac{3}{4}$ in. apart. A

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[1] Jacobson's "Operations of Surgery."

stout loop of catgut is passed through one of the apertures from before backwards by means of a silver probe with an eye very near its extremity, the loop is divided and the probe withdrawn. The posterior ends of the sutures are passed as mattress sutures through Poupart's ligament at different levels by means of a curved surgical needle. The ends are then drawn forwards through the second aperture in the bone with the aid of the pliable probe. The stitches are tied. The pectineus muscle and fascia which form the lower lip of the wound made to expose the bone, are joined to Poupart's ligament by catgut sutures.

Care has to be taken to avoid wounds of deep epigastric artery and the cord, whilst no compression of the vein should be possible when the deep stitches are tied. Professor Nicoll claims that it is less severe than Roux's operation, that the amount of closure can be better regulated, and that the risks of complications arising later are much less. It must, however, be very difficult in a patient of any stoutness.

The objection to sutures only in the closure of the femoral ring is that the fibrous walls by which it is surrounded are ill adapted to retain their enforced position when the holding power of the sutures has diminished through absorption. In cases where the hernia is of recent standing, more especially in young subjects, our aim can be obtained in this way. Where the ring is large, and has been dilated for a long time, the structures are stiffened and less yielding, and the pull of Poupart's ligament in body movements, in coughing, vomiting, etc., more insistent. Moreover, in old-standing cases, the pectineal fascia is often fatty and atrophied, whilst the ligament of Cooper is also smaller and less dependable than usual as a result of the pressure of the hernial swelling.

(*B*) THE USE OF FLAPS TO CLOSE THE CANAL.—The formation of a flap from the pectineal fascia and its implantation into the femoral ring was practised by Salzer. This fascia is often fatty, thin, and of little strength. The formation of a flap from the pectineus muscle and the fascia covering it, and its implantation in the canal, was advocated by Watson Cheyne. The muscle flap occasionally atrophies, leaving an opening larger than before the operation.

(*C*) THE FORMATION OF A CICATRICIAL BLOCK.—I do not know that any one has recommended this method as a routine procedure, it is only to be employed in urgent and special cases. It consists in division of the anterior wall of the canal including Poupart's ligament, directly upwards into the abdominal wall as high as may be necessary to permit of the reduction of a large irreducible hernia, or to allow the surgeon to adequately deal with a gangrenous piece of gut. On the conclusion of the operation the divided structures are carefully sutured to the posterior wall of the canal, including Cooper's ligament and the fascia over the pectineus, so that the canal may be obliterated by the formation of a dense cicatricial mass. I have used this incision and method on occasions, the result has been good after some years, but I have not had a favourable report of it from other surgeons. It is essentially an emergency operation.

(*D*) The Use of a Foreign Substance.—*Roux*.—After treatment of the sac, a metal staple is driven through Poupart's ligament and the femoral canal into the horizontal ramus of the pubis, thus closing the canal high up. The staple must not be hammered in too tightly. Crawford Renton has spoken well of this method, which in his hands and those of Professor Roux has given good results. It has been suggested against it that the staple may act as a foreign body, the bone may be injured and necrose ; the femoral vessels may be damaged, or the staple may cause pain. There is no doubt that its insertion would not be easy in a stout patient.

(*E*) Closure of the Canal at the Upper End.—There can be very little doubt that a closure of the canal at the upper end gives a promise of greater success in the radical cure of femoral hernia than any amount of suturing below. Better access is obtained to the neck of the sac of which a higher ligature is possible, unless it is well pulled down in the ordinary operation. This is, however, but a small matter, for it is unlikely that the ligatured point corresponds afterwards accurately with the upper end of the canal.

In 1898, Lotheissen described the following operation :—An incision is made half an inch above and parallel to the inner half of Poupart's ligament, separating the fibres of the external oblique aponeurosis. The edges of this incision are retracted, and the neck of the sac exposed and isolated just above the femoral ring and below the margin of the internal oblique and conjoined tendon. The sac is pulled up when possible and a ligature applied high up. The lower margins of the internal oblique and transversalis are then sutured to Cooper's ligament by means of chronicised catgut or kangaroo tendon. About four are required ; the innermost being placed close to Gimbernat's ligament, the outermost against the vein. The wound in the external oblique is closed by a continuous catgut suture.

Jacobson and Rowlands in recommending this operation state that they afterwards close the saphenous opening, and regard a vertical incision as better than a horizontal one.

R. H. Parry, in 1901, introduced a similar operation, in which the conjoined tendon and transversalis fascia are sutured to Cooper's ligament and to the pectineal fascia, and then two or three sutures are used to connect the conjoined tendon to Poupart's ligament.

Cantas, in 1906, recommended rather an elaborate operation. In this, through a transverse incision, Gimbernat's ligament is cut across and the sac treated. The aponeurosis of external oblique is incised parallel to and a little above Poupart's ligament. The pectineus muscle is detached from the pubis. The inner part of Poupart's ligament is fixed by sutures to the horizontal branch of os pubis, and through the orifice in the external oblique the detached margin of the pectineus is passed, and fixed by sutures to the margins of internal oblique and transversalis and conjoined tendon. The upper margin of the opening in the external oblique is brought down over the pertineus and sutured to the fascia in front of the thigh.

In 1899 the following operation was devised and first performed:—After a thorough cleansing of the parts, a vertical incision is made over the sac and portion of abdominal wall adjoining it, directly over the line of the femoral canal. The sac is exposed, isolated, opened, and its interior examined. Any contents are reduced if possible, adherent or diseased omentum ligatured and removed. After the sac has been emptied it is freed from its bed, and the neck drawn down and ligatured as high as possible with a silk ligature. The body of the sac is cut off below, and the ligature left uncut for a time. The upper end of the incision has exposed the aponeurosis of the external oblique, and by the use of a retractor the external ring is easily defined. Fatty tissue is cleared away from the surface of the aponeurosis, and an incision made outwards and somewhat upwards from the middle of this ring for a varying distance, probably an inch and a half on the average. By this means there are two aponeurotic flaps formed, upper and lower, and the object of the operation is to glide the upper behind the lower and secure it to the posterior part of the femoral ring, so that the strong aponeurotic shutter thus formed may cover the upper end of the canal and receive the weight of any structure attempting to pass through the canal.

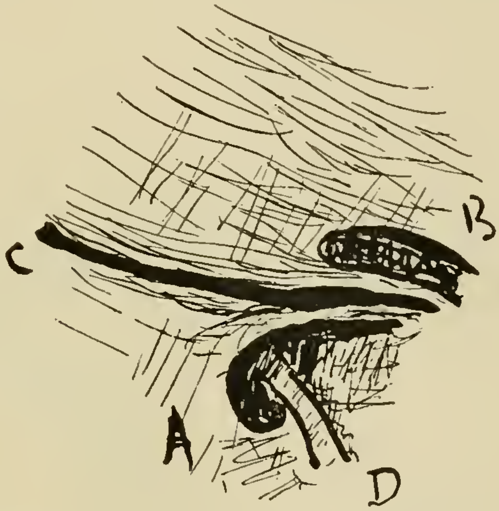

Fig. 1.—To show the relationship of the femoral and inguinal rings. A, Saphenous opening. B, External ring. C, Line of Poupart's ligament. D, Internal saphenous vein.

The external pillar of the ring with the portion of aponeurosis attached to it (lower flap) is now separated from the contents of the inguinal canal, so that the part of Poupart's ligament which crosses the canal is well exposed to the view of the operator. If the transversalis fascia about Poupart's ligament is thin, a pair of artery forceps is passed through it from the femoral canal and opened immediaty elabove the ligament. If the fascia is better developed it may be necessary to incise it; this should be done with some care, otherwise a vessel in the underlying neck of the sac may be wounded above the ligature and cause a little trouble. Through the opening thus made the neck of the sac is drawn by means of the ligature, which was purposely left long. The femoral canal is now free and the neck of the sac entirely intra-abdominal. The ligature is cut off close to the knot. A silk suture is then passed through the pectineal fascia (and Cooper's ligament in most cases) through the femoral canal and the opening in the fascia above Poupart's ligament; it then passes through the lower edge of the upper flap at a point which corresponds to the centre of the canal, and is carried back through the canal, when the needle is removed and a pair of forceps placed on the two ends of the ligature. A second suture of the same material is passed to the inner side of the first from above through Gimbernat's ligament and the inner part of the flap of the aponeurosis. A third is placed to the outer side about half an inch from the central one, and unites that part of the flap to Poupart's ligament. The outer and inner of these are tied and afterwards the central one. The aponeurotic shutter easily glides into its new position. As a rule, only one suture is required to attach it to the pectineal fascia, but occasionally two are required, according to the size of the opening. By this means a shutter, or flap, of great strength is placed below the ligatured neck, and across the upper end of the femoral canal; it is, moreover, composed of living tissue which will not atrophy from pressure or die from want of nourishment.

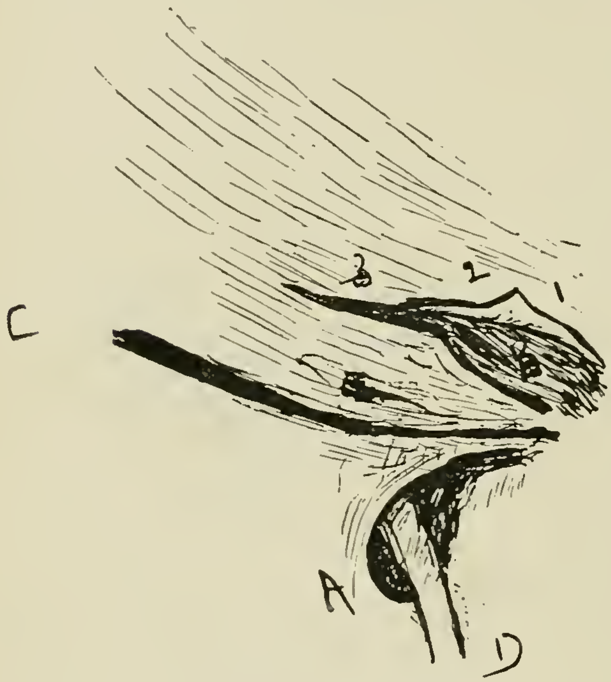

Fig. 2.—To show the line of incision in the aponeurosis of the external oblique, and (1, 2, 3) the position for insertion of sutures in the part which forms the shutter. A, B, C, D, as in Fig. 1.

As it is obvious that this shutter, forming part of the abdominal wall as it does, would have a great strain thrown on its new attachments should vomiting occur after the anæsthetic, or the patient be troubled with a cough, provision is made against this by suturing the free margin of the aponeurosis composing the lower flap to the surface of the external oblique in such a manner that the underneath portion (now the shutter), which closes the femoral canal, is in a relaxed condition. By this simple device any pull on the parts is transferred directly to Poupart's ligament, and does not affect the flap. The external wall of the inguinal canal is doubled in thickness throughout most of its extent, and the external ring diminished in size. Sometimes a couple of sutures are placed between the pectineal fascia and Poupart's (including Hey's) ligament, thus further closing the canal. The superficial wound is closed without drainage.

My notes show that I have now performed this method of radical cure in some eighty-one instances—fourteen male, sixty-seven female. In seven the operation was performed on both sides at the same sitting. Of the total number there were forty-three on the right and thirty-eight on the left side. The youngest patient was under 20 years of age, whilst the oldest was 78. The duration of the hernia varied from a few days to over thirty years. The clinical character of the hernia was as follows: reducible, forty-three; irreducible, thirty-four; strangulated, four.

The condition of the sac varied considerably; in most it was thickened, whilst in several it was very fatty. In one the peritoneal surfaces of the sac were irregularly adherent; in seven there was a definite hydrocele of the sac. In seventeen a portion of the omentum required excision. In three instances the case was complicated with inguinal hernia, operation for which was also performed at the same time. In one the operation of removal of the appendix was carried out at the same sitting, whilst in two others the appendix had been previously removed. In one, operation had been performed for femoral hernia on the other side. One patient was suffering from cardiac disease, a second had albuminuria, a third myxœdema, and a fourth acromegaly.

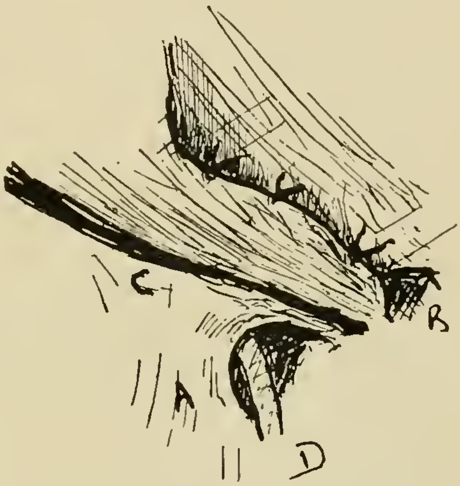

Fig. 3.—To show the sutures which unite the external pillar of the external ring and portion of aponeurosis continuous with it to the surface of the aponeurosis above the portion which now forms the shutter.

As regards the immediate result of the operation, in only five instances did any suppuration ensue in the course of the after-treatment, one was in a very stout patient with double operation, another was the subject of myxœdema, as well as considerable adipose deposit. There are no other complications to report. There were no deaths.

As regards the ultimate result it is difficult to speak definitely, for I have not been able to keep in touch with all of the patients.

So far as I can trace them, no recurrence has been found. Some are doing hard labouring work, and present a firm, healthy scar years after operation.

It has been urged against this operation, "but it is somewhat difficult to bring the tendinous external oblique down to the pectineal fascia, and to retain it there without undue tension."[1]

This statement is not quite accurate; theoretically it should be difficult, but practically it is not so, for the aponeurosis of the external oblique glides quite easily to a much greater distance than the point to which it is sutured in this operation. This must be known to any one performing the operation of radical cure of inguinal hernia at all frequently. There is no drag on the portion which forms the shutter; in the first place, it is held down by the sutures which pass through Gimbernat's ligament internally and Poupart's ligament externally; in the second place, it is kept quite lax and without any pull on the suture or sutures uniting it to the posterior boundary of the femoral canal, by the stitches which pass between the aponeurosis above and the upper margin of the lower flap. The object is to interpose a healthy living barrier to the descent of any hernia, one which is adequate from its strength at every age, and never undergoes fatty degeneration. It constitutes practically a sling of indestructible material, which does not depend upon the deep stitches to do more than secure its adhesion behind the ring, pressure being received by the curtain itself, not by the suture line. I have not found it difficult to perform this operation on stout patients, and the fact that the aponeurosis is not liable to degeneration such as is found in so many of the subjects of this hernia in the muscular and other structures sutured together in other forms of radical cure, gives it a great initial advantage, which I believe is maintained afterwards.

A METHOD OF OPERATION IN CASES OF MELANOTIC TUMOURS OF THE SKIN.

By J. Hogarth Pringle, F.R.C.S., *Surgeon, Glasgow Royal Infirmary.*

Melanotic tumours of the skin are comparatively rare. Among a considerable number of neoplasms of the skin that have been under my care, there have only been three cases of melanotic tumour.

This class of tumour is interesting from both the pathological and the clinical aspects. Formerly they were always spoken of as melanotic "sarcomata," but it is probable that many more of them are actually carcinomata than was once thought to be the case. The melanotic carcinomata, like all other carcinomata, tend to involve the nearest lymphatic glands; but, unlike sarcomata of other types, where this tendency is rarely seen, the melanotic sarcomata also constantly infect the nearest lymphatic glands, and whether sarcoma or carcinoma in type these melanotic tumours have a remarkable tendency to develop secondary nodules here and there along the course of the lymph vessels themselves, which lead from the primary tumour to the nearest lymph glands. I think this is a real tendency, and not merely an apparent one due to the fact that the nodules are pigmented and so become obvious earlier; in non-melanotic carcinomata of the skin this infection of lymphatic vessels, leading to definite nodule formation, only appears late in the course of the disease, while in non-melanotic sarcoma of the skin I cannot remember ever having seen this infection of lymph trunks referred to, and have never observed it in any case that has been under my own care.

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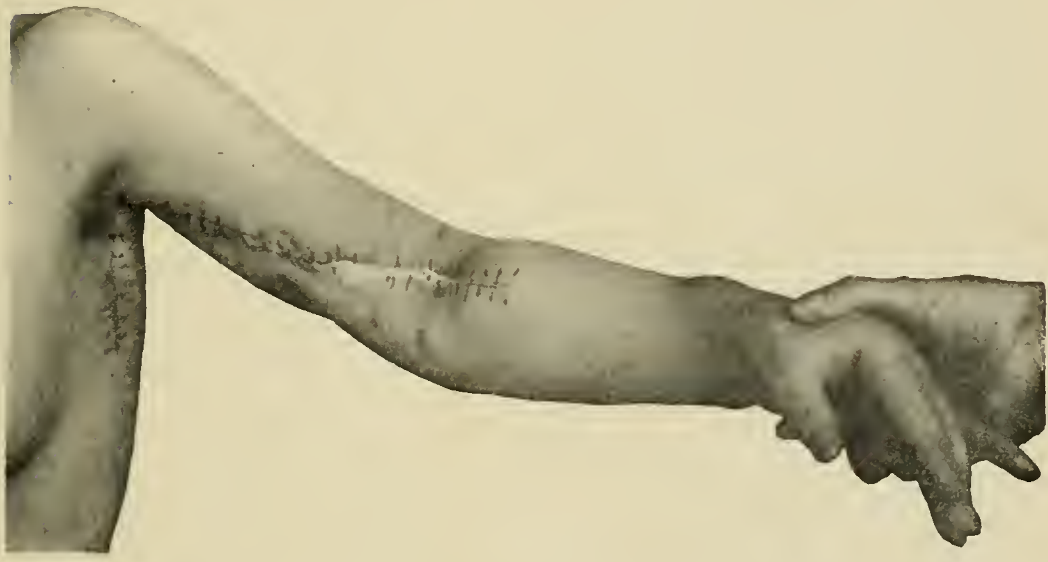
[1] Jacobson, "Operations of Surgery," vol. ii. p. 99.



Clinically, these neoplasms are of interest because of their great malignant tendencies; as a rule, and speaking generally, in non-melanotic neoplasms as long as a tumour is small, mobile, and not ulcerated, one believes that the extent of the disease is comparatively limited, but with a melanotic neoplasm it will occasionally be found that a small and non-ulcerated tumour of the skin will have caused secondary infections that are quite beyond the reach of surgery, and it is very remarkable how often the liver is involved by these tumours. The treatment of these cases is therefore a matter of the utmost importance. Operations for melanotic neoplasms must be carried through at the earliest possible moment, and they must be very free.

Case 1.—The first patient with this type of tumour that I had was an old man, seen at the Dispensary of the Glasgow Royal Infirmary, with a primary tumour, small and not ulcerated, situated about the bend of the right elbow, and with all the right axillary glands infiltrated, forming a large mass deeply pigmented and adherent both to the skin and the vessels, but along with this there were innumerable nodules, varying in size up to that of a pea, in the subcutaneous tissue of the inner aspect of the upper arm, all the way from the primary tumour to the axilla, some of them adherent to the skin and others free from it; the condition was too advanced for operation, but it suggested to me the idea of the operation which I carried out in both my other cases, and it is to this method of operation that I specially wish to draw attention.

Case 2.—My second patient was a girl, æt. 17, a domestic servant, who was admitted to the Glasgow Royal Infirmary, 12th November 1898. Her medical attendant wrote, saying he believed she had a melanotic sarcoma of the forearm; she had always had good health, but about two years before coming to the Infirmary had observed a growth in the skin of the left arm, which was about the size of a pea when it first attracted attention, and which had gradually enlarged but recently rather quickly. There had never been any mole or wart at the site of the tumour, and no injury was known. There was a small nodulated hard tumour, measuring 3·5 × 3 cms., adherent to and infiltrating the skin, which was puckered. The whole had a brownish colour, with deeper brown areas here and there and some bluish-black ones; it could be moved from side to side, but not vertically, and was apparently adherent to the deep fascia. It was situated about midway between the two condyles of the humerus. The axillary glands were slightly enlarged, but there was no evidence of further infection. The tumour with an area of healthy skin around it was surrounded by an oval incision, and from the upper extremity of the oval the incision was run up the arm along the inner bicipital groove to the axilla and on to the thoracic wall (the position and extent of the resulting scar are seen in the figure). The margins of this wound were dissected back to each side, and the tumour with the adjacent skin, the underlying subcutaneous and bicipital fascia (for a still larger extent than that represented by the skin area), and a strip of subcutaneous tissue at least 2 in. wide, and down to and including the fascia over the brachialis anticus, were removed, with the fat and glands up to the apex of the axilla in one continuous strip. Some of the glands were definitely pigmented.

The wound came together well everywhere except at the elbow, where there was a good deal of tension, but it all healed well; however, that part at the elbow broke down when she began to move the joint, though it ultimately closed, and she went home 24th December 1898.

The tumour proved histologically to be a melanotic sarcoma. She was seen frequently up to 1902 in excellent health. She then went to Canada, married, and has had children. She was last heard of in the autumn of 1907, when she was well—almost nine years after her operation.

Case 3.—A man, æt. 30, was admitted to the Glasgow Royal Infirmary, 27th October 1906, with a small tumour situated at the inner aspect of the left thigh at the lower third. It was slightly elevated above the level of the surrounding skin, measured 3 × 4 cms., was freely mobile in all directions, not tender. Deep black in colour, and with the surface not ulcerated. It had developed during the previous two years from a small pigmented mole, which had been present from birth. The lymphatic glands in the left groin were enlarged and showed up black through the skin, and some enlarged glands could also be felt above Poupart's ligament. The urine was normal, and the liver was not enlarged.

A similar operation was carried out in this case. The tumour was isolated by a free oval incision, and from the upper angle of this wound an incision was continued up along the inner aspect of the thigh to the region of the femoral canal and onwards, above and parallel to Poupart's ligament and the iliac crest, to a point midway between the anterior and posterior-superior spines. The skin was turned back to each side of the incision, and the tumour with the underlying fasciæ, along with a broad strip of the subcutaneous tissue and deep fascia, taken out up to the groin with the femoral and iliac glands, after division of the muscles at Poupart's ligament and along the iliac crest, in one continuous strip as far as possible. The iliac glands were removed as high up as the bifurcation of the common iliac artery. The wound healed well. The tumour was shown histologically to be a melanotic sarcoma; the femoral and the lowest iliac glands were infected, but the highest iliac glands were free.

This patient was brought before a meeting of the Glasgow Medico-Chirurgical Society on 7th February 1908, when he was well, without any evidence of recurrence of the disease.

I have not seen any description published of any patient operated upon in a manner similar to that here described, but it seems to me to be a method indicated by the life-history of these tumours. They become adherent to the underlying fascia, and spread by and infect the lymphatic trunks as well as the glands, as was seen in the first of the cases here described; and in our attempts to eradicate them we should, I believe, proceed on lines somewhat similar to these now advocated.

Mere removal of the tumour, even if associated with excision of the nearest group of lymphatic glands, is uncertain and may prove to be futile, for infection of the lymph trunks may already have taken place, although there may be no actual evidence of it on clinical examination at the time.

A radical extirpation of the disease will be most certainly ensured by excision of the tumour, with a good zone of healthy skin around it and a somewhat larger zone of the underlying subcutaneous tissue and of the deep fascia, with a broad strip of subcutaneous fascia up to and including the nearest anatomical group of glands at least; and all that is removed should be in one continuous strip as far as is possible.

REMARKS ON CHRONIC NEURITIS OF THE ULNAR NERVE, DUE TO DEFORMITY IN THE REGION OF THE ELBOW-JOINT.

By JAMES SHERREN, F.R.C.S., *Assistant-Surgeon to the London Hospital, Surgeon to the Poplar Hospital for Accidents.*

PLATES VI. AND VII.

INJURIES of the ulnar nerve in recent fractures, epiphyseal separations, or dislocations in the region of the elbow-joint, are well recognised. Bruns[1] found that out of 189 collected cases of nerve injuries in fractures, the ulnar nerve was involved in nineteen, and that in 101 fractures of the humerus the ulnar nerve suffered in fourteen.

But lesions of the ulnar nerve resulting from the deformity so produced and first making their appearance after a lapse of several years are not so well recognised, and occasionally lead to errors in diagnosis. As recently as 1900, Payr,[2] writing on lesions of the ulnar nerve in injuries of the elbow, makes no mention of their occurrence.

Attention was first directed to the subject by Panas, who made a communication in 1877 to the Academie de médecine.[3] He commences by saying, "The object of my communication is to draw the attention of the Academy to a cause of paralysis of the ulnar nerve which seems hitherto to have escaped observation. This paralysis, limited to the forearm and hand, interferes considerably with the functions of the part." He records four cases, of which three belong to this group. He mentioned that the condition had led to errors in diagnosis, and recorded that Duchenne had at first mistaken a case of this description, "in common with other eminent medical men," but that careful attention to symptoms had enabled him to make the correct diagnosis. The cases given in this paper will be found in the table on pp. 504–506. In one instance a microscopic examination was made of the damaged portion of nerve, removed after death. Bowlby in his text-book mentions Panas' paper and describes a similar case.[4]

These observations seemed to have escaped general attention, for ten years elapsed before any further cases were recorded, Weber,[5] in a paper upon the etiology of paralysis of the ulnar and median nerves from peripheral causes, described two cases, in one the injury dated back twenty-seven years, in the other thirteen years. He also briefly records cases reported by others;

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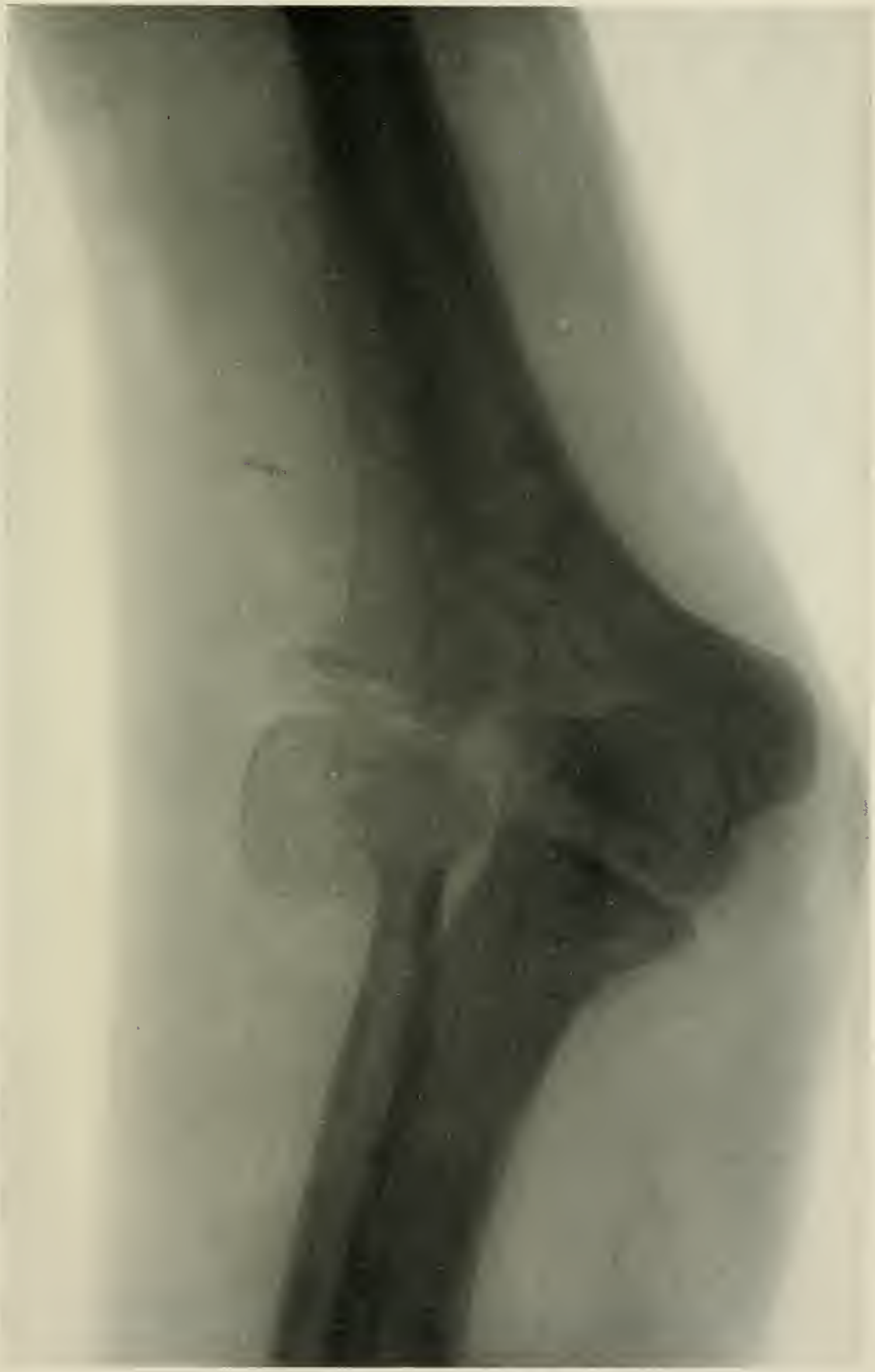
[1] *Deutsche Chir.*, Lief 27, S. 459.

[2] *Deutsche Ztschr. f. Chir.*, Leipzig, 1900, Bd. liv. S. 167.

[3] "Sur une cause peu connue de paralysis du nerf cubital," *Arch. gén. de méd.*, Paris, 1878, tome ii. p. 5.

[4] "Surgical Diseases and Injuries of Nerves," p. 255.

[5] *Deutsche Ztschr. f. Nervenh.*, 1899, Bd. xv. S. 181.



these I have as far as possible verified, and have endeavoured to collect all the cases which have been published since that date. The records of these cases are often deficient in the most important respects, chiefly with regard to the actual deformity at the elbow and its cause, and also to the exact sensory condition of territory supplied by the nerve, and the electrical reactions of the affected muscles. Before reviewing these cases, I have to record two which I have had the opportunity of treating by operation. The first of these I have already briefly mentioned in my Erasmus Wilson Lectures.[1]

Case 1.—L. C., a tailor, æt. 36, came under my care at the London Hospital in June 1904. He had noticed pain in the ulnar area of the hand and weakness of the muscles of the hand, increasing in severity for seven months. During the eighteen months preceding the onset of these symptoms he was working as a traveller, and noticed the pain in the hand soon after he resumed his work as a tailor. On examination, it was at once evident that there was an affection of the ulnar nerve, the hand was held in the typical ulnar position and the ulnar half of the flexor muscles of the forearm and the intrinsic muscles of the hand were wasted. The flexor carpi ulnaris and that portion of the flexor profundus digitorum which is attached to the terminal phalanx of the little finger were paralysed and gave the reaction of degeneration.

There was no marked change in the appearance of the skin. Stimulation with cotton-wool was unappreciated over the usual ulnar area on the palmar and dorsal surfaces of the hand; the boundaries of this area were well defined. A pin prick was everywhere appreciated, but to a less extent than elsewhere, and he was quite insensitive to stimulation with heat and cold; in other words, he had complete loss of epicritic sensibility, partial of protopathic.

It was obvious that the functions of the nerve were seriously interfered with, and on tracing the nerve upwards in the usual way I found that there had been an old injury at the elbow. On questioning him he seemed entirely ignorant of any preceding disease or injury in this situation. The limb was in the position of cubitus valgus, with increase in the carrying angle. On palpation, marked change was found in the relation of the bony points in the region of the elbow.

The internal condyle formed a marked downward and backward prominence, and the distance between it and the olecranon was markedly increased. The external condyle seemed stunted and irregular. The radius appeared to be further back than normal, and attached to its neck was a bony mass which moved with it (*vide* Plate VI.). The ulna was normal.

The injury had evidently been epiphyseal in early life, involving the capitellum, followed by premature synostosis with increased growth at the internal condyle.

The ulnar nerve was unduly prominent, and could be felt as a spindle-shaped swelling behind the internal condyle.

Considering the condition of the muscles, it seemed extremely unlikely that rest would result in cure. Accordingly, on 17th June 1904, I exposed the ulnar nerve, and found it enlarged in a spindle-shaped manner for about an inch; this swelling was quite smooth, and was not adherent to the surrounding parts. The groove behind the internal condyle for the ulnar nerve was obliterated. I resected the spindle-shaped enlargement of the nerve, and chiselled a fresh groove in the back of the internal condyle, which I lined with gold foil. I then sutured the nerve with two fine silk stitches passing through its whole thickness and surrounded the junction with foil. The amount of nerve removed was $1\frac{3}{4}$ in. The wound was closed without drainage, and the limb put on an anterior splint in almost full extension, with the paralysed muscles relaxed. Microscopic examination of the excised portion of the nerve and of the normal nerve above and the nerve below, showed the following changes. The swelling was composed of fibrous tissue arranged irregularly; coursing through this it was possible to make out a few axis cylinders running a very irregular course. In the nerve below were many nerve sheaths with cellular contents ("neuroblasts") and a few undegenerated axis cylinders.

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[1] *Lancet*, London, 1906, March 17.

The condition of the muscles and of their electrical reactions remained unchanged as the result of this operation. The loss of epicritic sensibility remained exactly as it was before the operation, but an area of loss of sensibility to prick became evident almost as extensive as the epicritic loss, and deep sensibility was lost over a smaller part of the affected area. The limb was kept in a splint for six weeks, and then movements at the elbow-joint were started.

Recovery followed the usual course. At about thirteen weeks after suture, recovery of sensibilty to prick began and was complete in sixty weeks. During the whole of this time and until eighty-six weeks after suture, the area of loss of sensibility to light touch remained as extensive and as well defined as immediately after suture. At this date it began to be restored, and was everywhere appreciated, except over the terminal two phalanges of the little finger, 132 weeks after suture. But a line of change was still present on the palm marking out the old affected area, and within this line sensibility to the compass test was defective.

The first return of voluntary power to the affected muscles was noticed in the flexor carpi ulnaris, sixty-six weeks after suture, at which date it reacted to the interrupted current. The little finger could be flexed at the terminal interphalangeal joint 110 weeks after suture, and the first dorsal interosseous was acting on the same date. When last I saw him, 132 weeks after suture, all the muscles were acting, but the ulnar position of the hand which was present before the operation was still marked. It is doubtful if recovery will be perfect, but he is in a much better condition than before the operation.

He resumed his work as a tailor in August 1906, and has been earning full wages ever since.

In the other case upon which I operated the condition was less advanced.

Case 2.—E. C., a woman æt. 40, was sent to see me at the London Hospital by Dr. Williams of Canterbury with the following history.

For two or three years she had noticed a dull aching pain in the ulnar portion of the hand, with occasional attacks of more acute shooting pain. This had lately become more severe and accompanied by numbness and weakness of the hand.

The left hand was held in the ulnar position, but the muscles, though wasted, acted voluntarily and reacted to stimulation with the interrupted current, but less readily, and a stronger current was necessary than on the sound side.

Light touch was lost over the complete ulnar area, but a prick was everywhere appreciated. Her forearm had been "bent" since the age of 5, said to be due to "inflammation following measles." She had been doing her usual housework with it, and there had been no increase in its amount.

The elbow was flexed to a right angle, and the flexed limb showed the presence of cubitus valgus. Only a few degrees of movement were possible. The relations of the internal condyle and olecranon were normal, but the head of the radius was absent from its usual position, and was felt rotating freely in an abnormal position in front of the humerus immediately above the capitellum. It was larger than normal (*vide* Plate VII.). There was no bony change in the region of the internal condyle, but the ulnar nerve was felt to be enlarged in a spindle-shaped manner.

On 25th October 1906 I excised the elbow-joint through a posterior incision, and finally exposed the nerve. At the point at which it passes between the two heads of the flexor carpi ulnaris it presented a slight constriction, and immediately above this the usual smooth spindle-shaped swelling. There were no adhesions to surrounding structures. I wrapped the nerve in Cargile membrane, sutured the muscles over it to keep it in position, and closed the wound without drainage.

Examination of the portions of bone removed showed that the deformity was an acquired one. The head of the radius had made a new articulation in front and above the capitellum, and this articular eminence and the lesser sigmoid cavity were covered with fibrous tissue. The joint surfaces of the radius and ulnar were devoid of cartilage and united by close fibrous tissue. The forward dislocation of the head of the radius resulted from an infective arthritis. The wound healed by first intention, and massage and movements were started on the tenth day. By this time there was no definite loss of sensibility.

She remained in hospital until 9th December, and left with good movement at the elbow-joint. I heard from the patient on 17th February 1907 that she could perform all movements with her forearm, and was quite well except for slight occasional pain in the little finger, and I have no doubt that recovery will be eventually complete.

These two cases illustrate this condition remarkably well. In both, the deformity had been present for many years, and was due in the first to injury, in the second to disease. Cubitus valgus resulted in both. In both, the onset of symptoms was gradual, with shooting pain in the ulnar distribution and wasting of the intrinsic muscles of the hand. In both, a spindle-shaped enlarge-

[*Continued on page* 507.

TABLE.

No.	Age and Sex.	Reference.	Nature of Injury and Disease. Deformity produced.	Time at which Symptoms appeared.	Nature of Symptoms.	Treatment and Result
1	Male, æt. 40.	Panas, *loc. cit.*	Fracture lower end of humerus; cubitus valgus; groove for nerve obliterated.	Thirteen years after injury.	Paralysis of muscles; sensibility "dulled"; ulnar nerve enlarged in fusiform manner.	Rest and galvanism for four months; well two months later.
2	,, ,, 19.	*Ibid.*	Sesamoid bone in internal lateral ligament of elbow-joint; *internal* to ulnar nerve.	...	Muscles wasted and paralysed; sensibility dulled; pricking pain; ulnar nerve enlarged.	Death from pyæmia.
3	,, ,, 63.	*Ibid.*	Enlargement of internal condyle of humerus.	...	Muscles paretic; sensibility dull; ulnar nerve enlarged.	Rest.
4	,, ,, 39.	Bowlby, *loc. cit.*, p. 255.	Injury in childhood, resulting in thickening around elbow; limitation of full extension.	About thirty years.	Muscles wasted, but reacted to both forms of electrical stimulation; no sensory loss; ulnar nerve at elbow enlarged to four times its normal size; twitching of muscles, ten years; wasting, ten months.	No note.
5	,, ,, 43.	Weber, *loc. cit.*	Dislocation of elbow; separation of epiphysis, resulted in cubitus valgus and enlargement of internal condyle, also dislocation of head of radius.	Twenty-seven years.	Three months' numbness and tingling, with wasting of muscles; "loss of touch and prick"; muscles, reaction of degeneration; spindle-shaped swelling ulnar nerve.	Rest; improved.
6	Female, ,, 33.	*Ibid.*	Suppurative arthritis, leading to defective movement; limb in semiflexed position; ulnar groove obliterated.	Twenty-four years.	Pain in fingers, "slight sensory change"; muscles wasted and paretic; no change in electrical reaction.	No note.

7	No note.	Duchenne, quoted Weber, *loc. cit.*	Fracture, internal condyle.	Six years.	Paralysis.	No note.
8	Male, æt. 30.	Schrener, quoted Weber, *loc. cit.*	Fracture in region of elbow in childhood.	Adult life.	"Ulnar neuritis."	..
9	No note.	Oppenheim, "Lehrbuch der Nervenkrank.," 1898, Aufl. 2, S. 331.	Fracture of humerus with formation of excessive callus.	Nineteen years.	Paralysis.	No note.
10 11	Males. No note.	Seeligmüller, "Lehrbuch der Krankheiten. periph. nerv.," S. 27.	Complicated fractures in region of elbow-joint, resulting in deformity.	"Many years."	Atrophy and paralysis.	do.
12	Male, æt. 34.	Bernhardt, "Die Erkrankeit. periph. nerven.," Th. 1, Zweite Aufl., S. 428; also quoted, Weber.	Fracture, internal condyle.	Twenty-five years.	Atrophy and paralysis, with reaction of degeneration; diminution of sensibility.	do.
13	,, ,, 32.	Guillemain et Mailly, *Gaz. hebd. de méd.*, Paris, 1899, Nov. 16, p. 1094	Fracture, right elbow.	Twenty-six years.	Symptoms for four months; ulnar paralysis with reaction of degeneration; nerve increased in size.	Nerve freed; no improvement in three years.
14	No note.	Bruns, *Neurol. Centralbl.*, Leipzig, 1902, Bd. xxii. S. 1045.	Injury to elbow-joint.	Symptoms came on late.	Paralysis.	No note.
15	Male, æt. 19.	Huet, *Arch. d. neurol.*, Leipzig, 1900, S. 531.	Fracture of humerus with backward displacement of the condyle.	Nine years.	"One year formication" in ulnar region; reaction of degeneration of ulnar muscles.	...
16	Female, ,, 28.	Curtis, *Journ. Nerv. and Ment. Dis.*, N.Y., 1898, p. 480.	Fracture, both condyles right humerus in childhood.	Many years.	Ulnar nerve on exposed surface enlarged; pain, numbness, and wasting two to three years.	Sheath of nerve split; nerve removed to front of joint; pain relieved.
17	Full grown man	Cohn, *Centralbl. f. Chir.*, Leipzig, 1904, S. 1400.	Fracture of external condyle of humerus in childhood, with cubitus valgus.	Symptoms many years later.	Ulnar paralysis.	No note.

TABLE—*continued.*

No.	Age and Sex.	Reference.	Nature of Injury and Disease. Deformity produced.	Time at which Symptoms. appeared.	Nature of Symptoms.	Treatment and Results.
18	Old man.	Cohn, *Centralbl. f. Chir.*, Leipzig, 1904, S. 1400.	Fracture of external condyle of humerus in childhood, with cubitus valgus.	Symptoms many years later.	Ulnar paralysis.	No note.
19	No note.	*Ibid.*	Injury internal condyle.	Nineteen years.	do.	do.
20	,,	*Ibid.*	Marked cubitus valgus.	...	do.	do.
21	Male, æt. 32.	Batten, *Brain*, London, vols. cxi. and cxii. p. 587.	"Injury to elbow-joint."	Fifteen years.	Fusiform swelling of ulnar nerve; numbness and wasting of hand, three years; ulnar muscles of hand paretic; loss of epicritic sensibility.	...
22	,, ,, 39.	Turney and Corner, not previously recorded.	Fracture right elbow at age of 12, leaving backward deformity.	Twenty-six years.	Increasing weakness of muscles of hand; typical ulnar loss of sensibility; complete reaction of degeneration.	Nerve freed by another surgeon; present condition worse than before operation.
23	,, ,, 36.	Sherren, *Lancet*, London, 1905, March 17; present paper.	Epiphyseal injury in early life; cubitus valgus.	At least thirty years.	Loss of light touch; paralysis reaction of degeneration, ulnar muscles; symptoms present for seven months: spindle-shaped enlargement of nerve.	Resection of damaged portion of nerve.
24	Female, ,, 40.	Sherren, not previously reported.	Arthritis of elbow "due to measles"; cubitus valgus; dislocation of head of radius.	Thirty-five years.	Aching, shooting pain in hand, two or three years; muscles weak and wasted; loss of light touch; spindle-shaped enlargement of nerve.	Excision of elbow-joint.

ment was present on the ulnar nerve behind the internal condyle, and in neither could the nerve be moved over the internal condyle (the condition was not one of dislocation of the ulnar nerve).

After a careful search I have been able to find twenty-one reported examples of this condition; these, with the two I have operated upon and the patient for whose notes I am much indebted to Dr. Turney and Mr. Edred Corner, will be found in the table.

It will be well to review briefly the information obtained from these cases. This, as will be seen, is in many cases meagre, yet there is, I think, sufficient to enable definite conclusions to be arrived at.

In nineteen cases in which the sex is mentioned, sixteen were males; this is undoubtedly due to their greater liability to injury in this situation, for of the sixteen cases due to injury in which the sex is mentioned, only one was a female.

The deformity in the region of the elbow was usually cubitus valgus, due, in the majority of cases, to an epiphyseal separation or fracture of the lower end of the humerus. Dislocation of the head of the radius was the cause in one patient, and in another the deformity was congenital. In some instances a backward enlargement of the internal condyle due to injury was the only deformity present.

A considerable time elapsed between the onset of the deformity and the development of symptoms, varying from six to thirty-five years. In most instances no cause other than the deformity could be discovered, but one patient thought that change of work had had something to do with it.

In all in whom there is a note on the condition of the nerve behind the internal condyle, it was found enlarged in a spindle-shaped manner, and when examined at operation was smooth and free from adhesions to surrounding parts. Interstitial neuritis was seen in the two instances (Cases 2 and 23) in which this portion of the nerve was microscopically examined.

This chronic neuritis appears to be due to the irritation or pressure to which the nerve is subject behind the internal condyle in movements of the elbow, owing to the alteration of its bony relationships here. The length of the nerve is increased, and in those cases in which the cubitus valgus is marked, the olecranon is displaced inwards and is prominent. In other cases the constant passage of the nerve over a backward enlargement of the internal condyle in movements of the elbow, is the irritating agent. These internal injuries, and not those due to external violence, seem to be the cause of the fibrosis.

It will be seen on referring to the table, that in most cases adult life was reached before symptoms presented themselves; thus, out of fifteen examples in which the age is noted, eleven occurred between the ages of 30 and 45, one at 63, one at 28, and two at 19. It is not altogether easy to explain the variations in the time at which the symptoms arise and the long latent period in many cases. But a similarly long latent period is present in patients who develop symptoms of nerve involvement in association with cervical ribs.

The fibrosis is slow and the interference with the functions of the nerve gradual; a marked growth of fibrous tissue may take place under these circumstances before pain or muscular wasting occurs. From the size of the spindle-shaped swelling when the patient first comes under observation, it is evident that the condition has been in existence for a considerable time. This and the greater liability to chronic inflammatory processes after youth has passed probably account for it to a great extent.

Errors in diagnosis still arise in connection with these cases. As the abductor-opponens group of muscles is not affected, the appearance of the hand, if muscular wasting is present, limits the lesion to the ulnar nerve after the diagnosis of a peripheral cause has been made.

When pain arises in the distribution of the ulnar nerve accompanied by wasting of the intrinsic muscles supplied by it, apart from a recent injury, this condition should be suspected, the course of the nerve in the forearm investigated, and the condition of the elbow-joint carefully examined. If cubitus valgus is present which is not due to injury, the possibility of the symptoms being due to dislocation of the ulnar nerve must be considered. In these cases the symptoms arise suddenly following a fall with flexed elbow, and the ulnar nerve, which is not necessarily enlarged, can be made to pass right over the internal condyle.

It is essential to make the diagnosis, as the treatment of the two conditions is different. The condition of sensibility and the electrical excitability of the affected muscles should be carefully investigated, for on this depends the correct treatment.

Permanent cure is only to be expected as the result of operative treatment. In early cases great improvement follows rest, but relapse takes place when the patient resumes the use of the limb. When the signs of interference with the functions of the nerve are not complete (incomplete division), means must be taken to remedy the deformity and so prevent injurious pressure upon and irritation of the nerve. This will vary with the cause of the deformity, and may necessitate excision of the elbow (Case 22), or chiselling a fresh groove for the nerve behind the internal condyle, or osteotomy of the humerus. In one case the nerve was removed to the front of the joint and the nerve sheath split. I do not view with favour splitting the sheath of the nerve. It is open to the objection that adhesions form between the nerve and adjacent structures, and it leaves the way open for increased formation of fibrous tissue in the nerve. The treatment should be by *removal of the cause* of the neuritis.

When the signs of interference with the functions of the nerve have advanced to the establishment of the reaction of degeneration, or in cases of incomplete division in which the relief of pressure fails to cure the patient, the damaged portion of the nerve must be removed and the anatomical continuity restored.

ARTERIAL STRUCTURE AND ARTERIAL FUNCTION.[1]

THIS is certainly one of the most interesting of the works which have recently appeared dealing with the circulation, the more so because on many points we find ourselves in opposition to its conclusions. For many years the author has devoted a great deal of time to the study of the vessels, and he has enunciated views which have, to say the least, led to discussion, from which, it is to be hoped, truth will eventually arise. In the volume now before us many of his former observations are brought together; the volume, however, is much more than a mere collection of earlier papers, for it contains a large amount of recent investigation. The work deals with the normal structure and functions of arteries; with blood pressure and its relation to arterial contraction and heart power; with diseased structure and disordered function of arteries; with the methods of estimating arterial pressure, and the results obtained by such modes of investigation. A new schema of the circulation is described in elucidation of the author's views. Much clinical observation is described in illustration of his opinions, and such subjects as angina pectoris, cerebral hæmorrhage, cerebral thrombosis, and the nervous effects of vascular spasm are fully dealt with With so much compressed into the limits of a volume of 194 pages, it must be obvious that there is abundant food for reflection in moderate compass.

It may be said at once that in so far as concerns the description of the normal and morbid structure of the arteries we find ourselves in substantial agreement with the author. The terminology which has been so often employed in describing the changes which take place in the vessels has been characterised not only by striking inexactitude, but also by obvious misconception, and the classification of arterial diseases which is adopted by the author is that which has always seemed to us the most scientific arrangement. As might be expected from the well-known characteristics of the author, the description of the different forms of arterial degeneration is remarkable for its accuracy, terseness, and lucidity.

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[1] "Arterial Hypertonus, Sclerosis, and Blood Pressure." By William Russell, M.D., F.R.C.P. Edin. Edinburgh: Wm. Green & Sons.

When we depart from the solid ground of structure and venture upon the quicksands of theory, we do not so decidedly see eye to eye with the distinguished author. It is probable that in many subjects on which he appears to differ from the current views held by those who have long worked at circulatory problems, the root of the apparent divergence lies in the mode of statement. We must be allowed to remark that he frequently puts forward some conception which he states to be the popular belief of the time, and the idea so projected seems to us a travesty of the generally accepted opinion. The chapter on blood pressure and vessel contraction, for example, contains the following paragraph:—"From much that has been written the question might be answered in the positive, and yet the conception is deplorably misleading as a practical guide. The rise of pressure is behind the constriction, and the physiologists measure it in the aorta. The physical law is perfectly simple when truly applied: if the capillaries constrict, the rise in pressure is in arterioles; if the constriction includes arterioles, the raised pressure tells from the small arteries backwards, and so farther and farther back. The whole mixed conception that a constricted vessel has its blood pressure raised has to be abandoned for a more accurate and infinitely more illuminating conception of the changes which take place." We should like to ask for a reference to any contemporary writer who has been guilty of the "mixed conception," as a considerable acquaintance with circulatory literature has failed to put us in possession of any idea of the kind. In the early days of the Ossian controversy it will be remembered that Samuel Johnson thundered the request to James Macpherson that he should produce the manuscripts. Without any particular desire to emulate the ponderous tendencies of the learned Doctor, we would really like to know in what particular enunciation of modern science the author has found the theories which he so warmly denounces. In the same chapter we have again a singular parody of current views. Let us once more quote from the author. "The second factor leading to increased resistance is an alteration in the blood channels themselves. Any narrowing of their calibre is undoubtedly a cause of resistance. That they do so narrow is also beyond question, although the importance of the fact has hitherto been obscured by the one-sided attention and devotion to the vessels as a mere system of elastic tubes." This presentation of "one-sided attention and devotion" is one of the most remarkable statements in modern medical literature, and the humorous side of the question appears when this announcement of the supposed belief is compared with the earlier remarks in the same chapter upon the current teaching in regard to peripheral arterial constriction. So far as we are aware, the conception of the arterial tree as a system of mere elastic tubes exists nowhere in modern literature.

It is indeed possible that the vasomotor phenomena of the circulation have received only too much attention. There can be no doubt that the vasomotor theory has often proved a veritable house of refuge for the pathologically destitute. There is a curious tendency here and elsewhere to hunt with the vitalist (as on p. 38) and at the same time to run with the physicist (as on p. 50); it shows itself from time to time in the discussion of different aspects of the various problems under consideration.

We entirely agree with the author in his statement that contractility is retained by sclerosed vessels. This belief has been sufficiently emphasised by Mackenzie as well as by the present reviewer, and yet, in spite of the remarks which we have both published upon the subject, we find our author making the following remark:—"As has already been stated in a preceding section, the idea of sclerosed and atheromatous arteries has hitherto carried with it the idea of rigidity. This is an unfortunate association, for it has led to the idea that thickened vessels are necessarily permanently thickened, that they behave in the body much as rigid tubes would behave, and that no remedial measures are available for removing such anatomical change." Once more we ask, where are such views to be found as he attributes to modern medicine?

The chapter which discusses the causes of arterial contraction is one of the most interesting in the book, and the author deals fully with the influence of poisonous agents in their double action upon the arteries by evoking contraction of the muscular wall, as well as by producing structural changes in the coats, and particularly in the intima. Here we have a really admirable exposition of a most important subject, illuminated by a wealth of illustrations culled from many a fertile field of physiological and pathological investigation, and brought with rare skill into harmony with clinical and therapeutical observations. This chapter, however, is marred, like so much of the book, by the singular tone of irritation expressed against certain imaginary views, attributed to unnamed observers whom we cannot recall, and who are arraigned for holding opinions which certainly are not current coin. We may again quote from our author. "The mechanical views of the circulation have had their day, and have effected their purpose almost too well; it is now time that we should think of the vessels as *living* tubes, contracting not only under the influence of nerve centres, but under the direct stimulus of substances present in the circulating blood." Where, in the name of Harvey, are views different to those expressed?

When we turn to the chapter on the clinical estimation of blood pressure, we must at once premise that we are quite at one with the author in his objection to the phrase "arterial tension." As a matter of fact, we have never, from first to last, in any of our writings, employed the term, for the excellent reason that we could never understand in what sense the word "tension" was used. Nothing may be said as regards his exposition of the methods of estimating blood pressure; it describes some of the procedures now so widely employed. But the great point in the chapter is that the author sets himself in opposition to a great deal of recent observation in regard to the factors determining arterial pressure. Put briefly, so far as we are able to grasp the significance of his contention, he believes that while the resistance exerted by the walls of the vessels is practically, if not theoretically, negligible under healthy circumstances, it is far otherwise in cases of arterial degeneration. He therefore places himself in absolute antagonism to Recklinghausen, Masing, and Janeway, who have very carefully estimated the amount of resistance in vessels which have undergone arterial degeneration. The author appears to refer to such investigations when he observes "that similar results have been obtained with arteries which have undergone what I have defined as arterio-sclerosis, is to be explained by the entire loss of tone in the dead vessel, so that it is no longer comparable to the living vessel." There is undoubtedly a good deal of confusion of thought underlying this contention. Everyone recognises that there are two factors in thickening of the arterial wall—structural changes and functional contraction—but it is a singular commentary upon the author's remark to find opposite the page following this forcible enunciation of his views, three figures of arteries showing what the author calls "hypertonic thickening." It would be really very interesting to know the relation of this hypertonic thickening in vessels, which we presume were obtained after death, to the entire loss of tone in the dead vessels spoken of on the previous page. There can be no doubt that his contention regarding the arterial wall emphasises an aspect of pressure estimation which should not be overlooked, but it must, however, be pointed out that even with brachial and radial arteries of the ipecacuan-root type, quite low pressures can be obtained with modern instruments, while, on the other hand, with perfectly healthy arteries the arterial pressure may be very high. The author's preoccupation is a striking instance of excessive devotion to one side of a complex question, and we feel that, although it is useful to have such arguments strongly stated, they constitute only a passing phase of a difficult discussion.

About the new schema of the circulation it is unnecessary to speak. The conditions of the experiment are so unlike anything in the circulation that the results cannot be regarded as being of much real utility. It would certainly have been better to have used arteries instead of rubber tubes, as has been frequently done in earlier investigations. We cannot agree with the author that the rubber tube is a better substitute for the living artery than the dead one, and we might ask why he did not employ some of those vessels which, as has already been referred to, have retained that function which he terms hypertonus.

The ninth chapter of the work dealing with practical applications is full of interest, but here also our author is troubled by his views regarding the wall of the vessel, and manifests too much disregard of such important factors as the composition of the blood, the changes in the capillaries, and the varying energy of the heart. Throughout this chapter, nevertheless, as indeed in the whole book, the views expressed are in the highest degree stimulating, even when we do not agree with them.

Without a doubt the chapter on the influence of the alimentary system is one of the best in the book, and the author analyses in the most luminous way the well-recognised relations of the alimentary and the circulatory systems. He gives a lucid exposition of recent views in regard to these matters. The same may be said with regard to the section dealing with angina pectoris, in which he brings into strong relief one of the many factors leading to the angina produced by arterial contraction.

This review has already exceeded due limits, but one other point must be referred to. There has been a general belief that elderly persons have higher arterial pressure than those of younger age. Clifford Allbutt has for long insisted upon this view, and it has received general acceptance. Our author sets himself the task of combating this opinion, and he asserts that it is not true. It is freely admitted by all that a proportion of elderly persons retain healthy vessels even to advanced years, while, on the other hand, some quite young people (the case of Wild, for example, in which a little girl of 12 had most advanced coronary sclerosis) undergo degenerative changes very early in life. There can be no doubt that the general belief is a correct one, although it would probably be stigmatised by the author as "an unwarrantable conception." Analysis of the ages and pressures of the group of elderly and aged persons which he gives, however, is in favour of the current view. On p. 121 we find that the average age is $72\frac{1}{3}$ years, and the average pressure 180 mm. Hg. Surely the author will admit that 180 is above the normal pressure for the average adult!

We have considered it our duty to speak perfectly frankly in respect of what we consider misconceptions in this interesting volume, and we are certain that the author, who is one of the most earnest seekers after truth, will appreciate our object in being thus candid. One of the main contentions in the work is that the vessel wall plays a very important part in our attempts to estimate the arterial pressure. It is possible that in certain quarters this factor has been underestimated, but we are of opinion that the author attributes too much significance to it. It is only one of a large number of factors concerned in the maintenance of the arterial pressure, and too much preoccupation with it is apt to make us lose sight of other and equally important influences. Another important argument is that the vessels not only respond through their nervous connections to the influence of toxic agents, but that they also undergo structural changes through the metabolic processes which such poisonous substances produce. Here we are heartily at one with the author, and warmly express our satisfaction that he has so clearly, so strongly expressed his views. The work, finally, is an earnest attempt to analyse and investigate some of the most difficult problems arising in connection with the circulation, and we have the greatest pleasure in recommending it to all those who are interested in such questions. It is instinct with the strong personality of an original thinker, and no one can peruse it carefully without having his mind stimulated to reflection and inquiry.

G. A. GIBSON.

THE RÔLE OF SUGGESTION IN TREATMENT.[1]

By Charles H. Melland, M.D. (Lond.), M.R.C.P., *Senior Honorary Physician, The Ancoats Hospital, Manchester.*

Man is not cured by drugs alone, but by every word that falls from the mouth of the physician; or, put in a different way, it is equally true that, however skilled may be the physician's use of drugs, diet and general hygienic measures, if he lacks the quality of being able to impress his patients with his sincere wish and his ability to do them good, all his other powers are largely thrown away. A man will not become a successful healer of men till he learns that his calling is not to treat disease but to treat patients suffering from disease, and that, while not neglecting to acquire a knowledge of the action of drugs, he must be prepared also to bring healthful influences to bear upon his patient's frame of mind by every legitimate means. Which of us does not know the despondent patient who makes up his mind that he is going to die and promptly does die, or the cheerful one who will go through double pneumonia and double empyema hopefully and come out smiling at the end. Whole groups of diseases, those that we class as hysterical or as functional neuroses, are due to minute alterations in those higher nervous structures which we take to represent the physical basis of the mind, alterations so minute that, whatever their nature, they may under some favourable influence be undone in the twinkling of an eye, and the whole bodily condition be transformed as by a miracle. Many of the distressing symptoms of neurasthenia have for their basis a perverted mental attitude, an undue sensitiveness of the higher nervous structures, which tends to magnify out of all proportion slight disturbances that in a healthy person would pass unnoticed; and in many other conditions of disease patients are extremely liable to magnify insignificant symptoms or to evolve wholly imaginary ones, thereby adding greatly to their sufferings and interfering with their recovery. It is surprising indeed in how many illnesses trivial disturbances of sensation are magnified so as to cause much greater distress than the symptoms of really grave disease which may be present.

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[1] An Address read before the Clinical Society of Manchester, February 18, 1908.

Now in all these cases it is the process of suggestion that is at work. In some way or other, out of the patient's inner consciousness or from his previously gained knowledge of disease, or as the result of injudicious remarks of friends or of quack advertisements in the newspapers, abnormal suggestions, which are not warranted by the bodily state, are evolved, and there take firm root in a nervous system that is more than usually susceptible to suggestion. It is perhaps not easy to realise how apt even the healthy nervous system is to accept suggestions. We all know that in our field of vision there is an area, corresponding to the blind spot which is a blank space, but we are normally unaware of it because by a subconscious process of suggestion it is filled up so as to be in keeping with the areas surrounding it, and this is only a single physiological illustration of our readiness to accept as realities what a critical examination shows to have no real existence.

We must be careful, indeed, in cases of illness, that the suggestion does not come from ourselves. Forel writes: "I am fully aware that I once suggested gastric ulcer to a patient in whom I suspected this condition, by having a serious countenance and by carefully palpating the region of the stomach and ordering rest in bed and milk diet. I suggested the site of the pain by means of a pointed question, and the result of my want of knowledge of suggestion at that time was that the patient was confined to her bed for many months of a suggested illness which was not really present." I have more than once had patients after one or two interviews summon up their courage to ask if they were really suffering from such and such grave disease, from which of course they were absolutely free, but the presence of which had been suggested by some casual remark of mine or some emphasis in examination, and I am afraid that there have probably been more who have been made still more miserable by not venturing to speak out. At any rate I think it is worth while to bear in mind the advisability sometimes of asking about important and significant symptoms in a not too pointed manner, especially in persons of acute intelligence, or those, not so common, in the habit of consulting medical dictionaries.

We thus see the part that suggestion plays in the production of symptoms; now let us turn to the methods by which it may be diverted to the better use of relieving trouble.

Our whole process of treatment, the giving of medicine, the prescribing of diet and the like, contains in it, besides the efficacy of the measures adopted, a strong element of suggestion. Our patient comes in the expectation that his doctor will do him good; if he had not this expectation he wouldn't come; and this is rendered more sure and certain by what he judges to be evidence of the doctor's skill in diagnosing and understanding his condition, and by a confident expression on his part of ability to help him. Some, verging on quackery, will confidently assure their patients that they have special knowledge which they do not really possess; sometimes this line of action is intentional, at others it is perhaps unintentional quackery, because they are too ignorant to recognise their own lack of knowledge. This is an illegitimate mode of increasing a patient's faith, not only because it is a rather gross form of deception, but because it frequently verges on the suggestion of relative incompetence in other practitioners. It has too much of the spirit of the illustrated advertisement of the quack medicine vendor, recounting the wonderful cures of his specific after many doctors have failed. I have a very acute recollection of meeting a patient who had been under my care with transverse myelitis, and who had been discharged from hospital as incurable. There was no doubt about the diagnosis, nor is there any doubt that spontaneous recovery may occasionally take place. He had been completely bedfast, yet I met him walking cheerfully down the street, and he told me that it was all due to Pink Pills, and that his picture was to appear in an evening paper next week! If, in the faith engendered by his recovery some woman with a hysterical paraplegia takes a course of Pink Pills she will in all likelihood be cured, and the happy result will be attributed to the pills. So much might be to their credit, but it is immeasurably outweighed by the discredit of the thousands of cases their proprietors have confidently promised to cure, with of course no benefit, but often disastrous results in the loss of valuable time, when possibly proper means might have effected relief. So I have no wish for such methods to be imported into legitimate practice. I should like to add here that many of the "cure all" variety of quack medicines are largely composed of purgative drugs which get rid of toxic bodies from the bowel, and so by giving rise to a feeling of increased well-being suggest the idea of further improvement in symptoms of a functional origin.

Still stronger is the effect of other modes of treatment, which we can only regard as belonging to the same category as quack medicines, because they profess to cure organic diseases by means which we know to be inadequate to do so. The methods are those which make a strong emotional, especially a religious, appeal. The conditions of faith are largely emotional; faith is not necessarily founded upon reason,—witness Sir Thomas Browne, who held that it was easy and necessary to credit what our eye and sense had examined, but preferred to exercise his faith upon impossibilities. We have got to bear in mind then this emotional basis of belief, and we all know that nothing so stimulates the emotions as the presence of, or the knowledge of, many others of the same way of thinking. The behaviour of large crowds stirred up to a pitch of frenzy by some passionate idea, the widespread hysterical epidemics of the Middle Ages, and the uncontrolled emotional exaltations of religious revivals, are all so many instances of the heightening of emotion by community of ways of thought. We can well conceive, therefore, the powerful suggestion contained in the belief of cure which is associated with the strongly marked emotional conditions characterising "Faith-healing," "Christian Science," and "Visits to Holy Places." The question of Lourdes, with its record of thousands of modern miracles, has been dealt with by Zola, and doubtless many of you will be acquainted with cases that have made unavailing visits to our local Lourdes, Holywell, in North Wales. But in spite of many failures the faith in miraculous cures is not lost, because every now and again the emotional suggestion of the place does get rid of functional disorders in as striking a manner as the endo-laryngeal application of the electric current will get rid of hysterical aphonia. Faith-healing stands on the same plane, and so does Christian Science, though this latter is somewhat more offensive on account of its cocksure assertiveness. Its main thesis is that as the body of man is the exact manifestation of his soul, so it must be in complete subservience to it, and there is no effect of accident or disease which cannot be controlled or eliminated by the power of the mind. The more perfect we become, the more complete will be this control of the body by the mind. Fire burns us, not because it has any power to harm our body, but because, in our imperfection, our mind is still labouring under the belief that it can. The effect of drugs, again, is wholly a matter of suggestion. The Christian Scientist will say that if a man is given a dose of colocynth it will act as a purgative simply because of the mental effect of having been taught that colocynth is a purgative drug. If a man has severe pain relieved by an injection of morphia, it is simply because he has so often been told that morphia is an anodyne; that it acts purely as a means of affecting the body through this previous mental concept; witness indeed what, they will triumphantly aver, many doctors have found, that if on occasion an injection of pure water be substituted it is equally effective. That there is a germ of truth in all this no one will deny, but it is a germ only, wrapped up in a whole bundle of falsehood. If only their theories had not carried them to such extravagant lengths, if only they had been content to cast their nets less widely, the Christian Scientists might justly claim that they had done good by demonstrating to their devotees that the will and the emotions have a great influence over the bodily functions, and by leading them into a frame of mind in which they are able to convince themselves that imaginary diseases have no real existence.

I have made this long digression in order to emphasise what methods we have to avoid in our legitimate application of suggestion to the relief of our patients; put briefly, they are the methods of the ignorant quack, based upon no knowledge except that of the weaknesses of human nature. Of such legitimate use, I believe that the first essential is careful and accurate diagnosis. A judiciously conducted inquiry and an exhaustive physical examination serve two valuable purposes—first, to set at rest the question in your own mind, to what extent the symptoms depend on organic and to what extent on functional disease, and then to convince the patient that you have done all that is humanly possible really and fully to understand his case.

Next you want to talk to him, always on the hopeful side, about prognosis and treatment, discriminating clearly between those symptoms which you take to be dependent on organic disease, which will require careful treatment, and those of a functional character, which you will have to explain are in their nature temporary and evanescent, to a considerable extent under the influence of the will, and which will steadily assume less importance in his mind when he is assured that they are not dependent on serious organic disease. I have in my mind at the moment a miserable dejected dyspeptic, who had been assured in his youth that he would never live beyond the age of 40. He was turned 40 when he came to see me, but he took all the vague aches and pains about his stomach and heart to be so many signs of impending dissolution, and was confident that he would never see the year out. No sooner was his forty-first birthday past, however, than he became open to conviction on the subject, and rapidly began to improve. One of the strongest weapons of suggestion that you can wield is this assurance that, after a most careful and thorough examination, you can find no evidence of any serious organic disease at the bottom of certain symptoms.

It is not always easy to explain to the lay mind what is meant by "functional" disorders or by neuroses. If you can get your patient to understand that certain of his nerves are unduly irritable and sensitive, so that they magnify bodily sensations which would otherwise have but little effect on him, or that certain of his organs, though not seriously diseased, are doing their work in a wrong way, I think you will have done fairly well.

Then you must go carefully over directions for treatment. Here, again, care in the matter of detail (being diligent to avoid, if you can, finicking and over-dogmatic ways) will suggest to your patient that nothing in your endeavour to get him well is being left to chance. If his trouble is purely or mainly of a functional nature, then, without drugs, your suggestive methods will probably effect a cure. A certain school of medical practitioners would give him a sugar pellet or some burnt sponge, and tell him that it will cure him, and the chances are that he will act up to the suggestion and get well; but give him such drugs, and give him directions to follow such a régime as will genuinely alleviate symptoms and increase his sense of general well-being, and the suggestive effect is more than redoubled. The beginning of a feeling of improvement has the most powerful suggestive influence—in no case is it more true that it is the first step that counts. If you have a hysterical patient who is under the impression that she is unable to walk, if you can only get her, even with much persuasion and assistance, to take a few steps, the rest of the process of cure is usually straightforward; the evidence of those few steps tends vigorously to replace the suggestion that she cannot walk by one that she can, and this latter gets strengthened by every successful attempt.

But there are other suggestions besides these that may be brought to your patient's assistance. We all know that any sensation or idea is made stronger and more definite by concentrating our attention upon it. We have seen that in many morbid states there occurs an abnormal concentration of attention upon sensations which the normal nervous system habitually neglects. To counteract this we have to educate the faculty (in some ways a most valuable one) of inattention; to get a patient when he feels himself too much inclined to pay attention to what we have assured him are immaterial and transitory symptoms, to deliberately transfer his attention to some new object of interest. A standing example of the efficacy of this method is the oft-told legend of severe toothache ceasing by the time the dentist's doorstep is reached. The attentive contemplation of horrors to come has effaced the present pain. This, of course, is too drastic a method to apply in practice, but I have found myself on two occasions that the only way I could get the better of a bad toothache was by taking a long walk in the country, so giving myself other things to think about. So you must try and get your patient interested, in various hobbies for instance. Don't let him have time hanging on his hands with nothing to do in it but to dwell upon his troubles: if his mind is busily occupied with reading, or carpentering, or gardening, or other engaging pursuits, there will be less likelihood of his real or imaginary diseases looming so large on his mental horizon. You may even feel that you have got to suggest to him to take an interest in wife or children, or other relations and friends; you will often find your patients selfish and self-centred; and the sooner they are made to realise this, in perhaps somewhat guarded, but not always too guarded terms, the better for them. Again, the mental occupation of a man's work is of value, and a patient may often pick up rapidly on being got back to work, part of the more rapid improvement being due to the auto-suggestion that he really must be nearly well if you think him able to restart.

There is a more direct method still, of which much use is made in Christian Science and other forms of mental healing. The method is quite valid if applied to the proper cases, and there is no reason why we should debar ourselves from making use of it. The Christian Scientist is directed to repeat frequently certain phrases asserting the non-existence of disease and the unreality of any symptoms to a mind strengthened by perfect faith. So in the case of the patient whom you consider to be suffering from troubles which should be wholly or in part amendable to suggestion, there is no reason why his faith in your judgment and skill should not be emphasised by getting him to repeat to himself occasionally some such sentence as "The doctor has told me, after careful investigation, that many of my troubles are in no way dependent on any serious disease, but are to a large extent of such a nature as to be under the control of the will, and there is no reason why I should not be able by appropriate mental efforts to get rid of them." At any rate, the more a patient can be got to keep constantly in mind the hopeful assurance of his recovery, whether or not he be formally directed to repeat it to himself more or less frequently, the more deep and more lasting will the suggestive effect be.

I want finally to say a few words with regard to hypnotism. They will only be a few, because I have already run to considerlength, and because my personal experience of it is as yet limited. Now hypnotism is, above all things, a condition of increased suggestibility. This is no occasion to go into a deep psychological discussion as to the nature of hypnotism. It is well recognised that people who talk and walk in their sleep will, whilst asleep, often answer questions and follow out suggestions in a sort of automatic unreasoning manner. The nearest conception that I am able to gain with regard to hypnotism is of a very similar frame of mind artificially induced. It appears to be a definite fact further, that not only are the individuals in hypnosis particularly susceptible to the suggestion of the moment, but that it is possible in it to impress new ideas upon the mind, which though they may fade from consciousness on awakening, will remain impressed upon its subconscious strata and may subsequently affect its mode of action. I cannot say that in any case in which I have used it I have succeeded in getting any very high degree of hypnosis, but in most I have got rigidity of and inability to move the upraised arm, and in a few have obtained suggested analgesia. But I think it is agreed that for purely therapeutic purposes the lower degrees are about as effective as the more profound. Now for a few of the cases in which I have tried it. Take this: A girl of 16 came to see me, breathing at the rate of 110 to the minute. She said she had been short of breath for three months, but had been so much worse during the last month that she was obliged to give up work. She jerked up her shoulders at each inspiration as the result of over-action of the accessory muscles. Her doctor had told her she had chronic asthma, a good enough description so far as it went. There was nothing whatever wrong with her heart or lungs, and the condition was obviously hysterical; there was no cyanosis and no appearance of distress. I was able to get her hypnotised and suggested to her that the thing would certainly cease, and that very soon. There was no change whatever at the time, but when she got up the next morning it was much better, and when I saw her again three days later she was breathing quite normally, 22 to the minute. Here is another case: Abright and sensible but highly nervous Jewish girl of 11 was brought to me. She lay awake in bed unable to sleep because she imagined men and creatures and things she had seen in books to be under her bed. Under hypnosis I suggested to her that there couldn't really be anything there, and that she was to look under the bed each night to reassure herself, a thing she had never dared to do before. The suggestion was effective, but when once in bed, even after having seen that there was nothing there, the imaginary terrors again returned, with new ones—of men trying to break into the house. Further suggestions were made, to convince her that as she had looked, there couldn't be anything under the bed, and that as her father and mother were up no one could get into the house, and that she was to go to sleep as soon as she laid her head on the pillow, and not to lie awake thinking. For about three weeks there was little change, then the mother failed to bring her and I thought she was tired and had gone to try elsewhere, but a fortnight later she came with another child and explained that she had stopped attending because the child had got all right! I have employed it also in several cases of nocturnal enuresis in children, with rather varying success. Here is one of the more successful ones. A girl of 9, quite bright and intelligent, had been coming to see me for some months. She had improved a good deal under treatment; in the late autumn she had wet the bed almost every night, but latterly it had only been about twice a week. The suggestion I employed was that she should get up at night out of her sleep to pass water when she felt any desire to do so, and then get back into bed and go to sleep. She was brought back again a fortnight later, with the account that she had not wet the bed once, but had got up four times and passed water. Her father told me that he had never known her do this before, as she was an unusually sound sleeper—as is often the case in these children with nocturnal enuresis. It illustrates very well the impression which suggestions during hypnosis make on the allied subconscious condition of sleep. Other cases of enuresis have been less successful, and there is one case of histrionic spasm, which I showed at the Clinical Meeting of this Society in December, which I have persevered with for some weeks with as yet but little improvement though I am still hopeful.

Gentlemen, I have finished my rather rapid account of the part that suggestion plays in treatment; I hope that what I have said will give you cause for thought, and that it may prove of some use to you in practice.

AN EASY METHOD OF EXCISING PILES.

By Alexander Don, M.A., M.B., C.M., F.R.C.S.Ed., *Surgeon to Dundee Royal Infirmary.*

The method is not perhaps new, but, as it has several advantages to recommend it over the clamp and cautery, and the more difficult operation of Whitehead, and as it does not require a single new instrument for its performance, it may be worth recording. I am indebted to one of my old teachers for the idea, and necessity first compelled me to use it. The occasion was one summer in the country when my Paquelin's cautery refused to work, and when the fires were all out. I was without assistance, and the mass of piles was practically all round the opening, and bled freely, and I had recourse to this method of controlling the hæmorrhage.

The necessary instruments are—Six pairs of artery forceps, six harelip pins, a good-sized cork, a knife, and catgut sutures and ligatures. The catgut should be chromicised to prevent too early absorption. The cork is cut into a thimble shape, and a fold of gauze is tied round it, leaving a loose part beyond the ligature for a handle. The sphincter is first dilated as usual, the piles are caught all round by the six artery forceps and pulled down, and the cork then pushed into the rectum with the gauze handle protruding. The forceps are pulled upon and readjusted till the healthy mucous membrane is well in sight all round, when the plug is drawn down till the edge of the cork is just above the upper limit of the piles. The handle of the cork and the forceps, held all together in the left hand, are now pulled well down, and the pins stuck through the skin about ¼ in. outside the white line all round and sloping inwards till they just pierce the cork. The pins lie outside the sphincter in the submucous tissue, and just underneath the dilated veins, and must not be pushed through the sphincter. The method of traction just described ensures the safety of the sphincter. The cork alone is now further pulled upon, and the pins thus raised to the perpendicular are stuck firmly into the cork. A double turn of thin rubber tubing, held on the stretch, is wound between the pins and the body, and forms a tourniquet, the ends being held posteriorly by a pair of forceps. The other forceps are now removed. The whole pile area may then be carefully dissected off the submucosa with the knife, care being taken to leave at least ¼ in. of skin and healthy mucous membrane in front of the pins. Any blood clots are scraped away with the handle of the scalpel. The tourniquet is now taken off. Two or three vessels at the most will require ligature, but these being held forward by the pins are easily caught up. A continuous catgut suture is next applied, with fixing interruptions at three or four places. This suture should first pick up the mucous membrane, then take a bite of the submucosa, and lastly pick up the skin,—three separate insertions of the needle. A dry gauze plug is placed in the anal canal, its end protruding, and this easily controls any oozing, and comes away usually of itself after the first day. Iodoform ointment on lint may then be applied. The sutures come away in seven to ten days, leaving a few places to skin over, but if ordinary catgut has been used, they come away too soon, and the mucous membrane retracts and leaves a wide bare area, with disastrous after-effects. This does not happen with the less absorbable catguts. No true skin is removed, and no morphia suppository is used. The action of morphia per rectum is somewhat uncertain after excision by this method. A hypodermic injection may be given later if necessary.

The method is simpler than even the ligature, and one requires no assistance. It can be done by local infiltration anæsthesia quite painlessly. It can be applied to small areas, or one side only may be dealt with, but other methods are simpler for single piles. It leaves a neater outlet than the clamp and cautery, with which one cannot avoid tags, and is apt to overlook some of the more internal piles. If badly done, too, the hæmorrhage is greater with the cautery, and cannot be so easily controlled. Besides, the clamp and cautery are hardly modern surgical instruments, and should follow into the museum, the serre-nœud and écraseur, once used for fibroids and tongue operations.

This operation really accomplishes the same as Whitehead's, but the complete absence of hæmorrhage during the removal of the pile area makes its performance a much simpler matter. It is impossible by this method to injure the sphincter, as is often done by surgeons who try Whitehead's method, without following his instructions to carefully expose the external and internal sphincters "by rapid dissection of the mucous membrane and attached hæmorrhoids."

THE PROPAGATION OF PLAGUE.

By Theodore Shennan, M.D., *Pathologist to the Royal Infirmary, Edinburgh.*

The Reports issued recently by the Second Royal Commission on Plague have aroused widespread interest in the etiology of the disease, particularly as to the probable manner of its propagation from one individual to another. Seeing that the results attained by the Commission confirm in a remarkable manner the conclusions arrived at by Simond in 1898, and indeed to a greater extent than seems to be generally recognised, I think it but right to recall his conclusions, so that he may receive the credit due to him. Since that year they have furnished a basis for my own belief and teaching, confirmed and strengthened as they were by private information received about the same period from friends in the Indian Medical Service, who had been on Plague duty.

Simond's paper was written in August 1898, from work carried out in Bombay and its neighbourhood, and was published the same year. It is admirable alike for its arrangement, completeness, clear argument, good judgment, and rational conclusions, so that I have never been able to wholly understand the manner in which it has been neglected.

While the whole paper is of interest, and well repays perusal, from the historical retrospect, with the customary reference to the earliest description of an epidemic (1 Sam., chaps. v. and vi.) downwards to the later discussions as to the relation of rats to the disease and to the human patient, I wish specially to confine myself to a consideration of the summary and conclusions, adding occasional explanatory and amplifying extracts from the body of the paper.

Simond's Conclusions (p. 685): "1. Rats and man are the two factors in the transport of plague; man conveying it to distant localities; rats conveying it from place to place in one neighbourhood, being chiefly responsible for its epidemic character.

"2. Introduction of an infected rat into a healthy locality is generally followed in a short time by epidemic cases in man. The introduction of infected human beings into a healthy locality is not always followed by indigenous epidemic cases. For this result, a co-operation of favourable circumstances is necessary, amongst which a preliminary transmission of the virus to rats seems to be the most important. There intervenes between the decease of the human imported case, responsible for the epidemic, and the appearance of the epidemic, a period of incubation which represents the lapse of time necessary for the development of plague in rats.

"3. The severity of the human epidemic is in accord with the severity of the rat epidemic. Its progress in a town follows the direction taken by the rats in their migration. When the great mortality amongst rats ceases, we may conclude that plague continues to flourish amongst them in a benign form. The human cases termed sporadic which appear after the decline of the epidemic ought to be attributed to this cause.

"4. Seasonal influences are little marked in the development of epidemics of plague, nevertheless the great epidemics have so far reached their highest point (*apogee*) at a time of the year away from the warmest season.

"5. A second epidemic of plague generally manifests itself twelve months after the appearance of the former one, from which it is separated by a more or less prolonged period of quiescence. The reason for the return is not determined; it is allied to the epidemic return among rats, and depends in part on the 'repeopling' of the towns by these animals.

"6. The results of experiments in the infection of rats, monkeys, and squirrels ('the palm rat') by *food* mixed with plague cultures, and with blood and organs of infected animals, demonstrate the falseness of the theory which makes such means an habitual cause of the infection of these animals.

Observations and experience are equally opposed to the idea of an habitual infection of man by micro-organisms distributed in his immediate surroundings, and associated with accidental lesions of the skin.

"7. In a certain proportion of cases the point of entry is marked by a local reaction, the primary pustule (*phlyctène précoce*), which is always situated in a region where the skin is delicate and healthy."

In cases of plague where the local reaction and the regional reaction (bubo) are wanting, Simond thought that their absence was due to a greater virulence of the microbe, and not to a different mode of penetration. This probably may be taken as also referring to pneumonic cases.

"8. The idea of a *parasitic transmission* which is evolved from clinical observation is in agreement with the invasion of sick rats by fleas, which several hours after death abandon the corpse to attack other animals *and man*. This is confirmed—(1) By the presence of the specific microbe in the intestinal contents of fleas which have absorbed the septic blood. (2) By certain points in the transmission from rat to man, and from man to man. For the latter it is possible that other animals, particularly the bug, may intervene. (3) By the possibility of the transmission of plague to a healthy rat by its cohabitation with a plague-infected rat, infested with fleas."

P. 679. "The flea (greyish) preserves, during a period not yet determined, the microbe, in cultivation, in the digestive tube, and the inoculation of the rat with the intestinal contents can give it plague."

P. 677. "The different forms of spontaneous plague in man and animals arise ordinarily from one sole mode of infection, parasitic inoculation *within* the skin (*l'inoculation parasitaire intra-cutanée*).

"We do not know if this flea is a variety distinct from that one, of a reddish colour, which is common on man and the domestic animals, nevertheless we are certain, from experiment, that, transported from rat to man or to dog, it *attacks them immediately*.

"Yersin discovered that plague bacilli are cultivated in the intestines of flies which had ingested them; hence it is not surprising that the same fact exists as regards fleas. We have a certain number of times examined microscopically the intestinal contents of fleas taken on rats spontaneously infected, and in several cases have determined the presence of a bacillus morphologically like the plague bacillus. It was not possible, for want of suitable apparatus, to isolate this organisism in culture, but we were sure of its identity by an experiment conducted as follows:—If one place fleas on a plague-infected mouse shortly before it dies, and examine their stomach contents after twenty-four hours, one discovers microbes which have the appearance of those of plague. These do not exist in the stomach contents of fleas which had not been placed in contact with an infected animal.

"9. The mechanism of the propagation of plague comprehends the transport of the virus by the rat and by man; its transmission from rat to rat, from man to man, from man to rat, and from rat to man, *by parasites*. Prophylactic measures must therefore be directed methodically against each of these three factors—parasites, man, and rats."

I may summarise the more important conclusions still further:

1. Man is responsible for conveying plague to a distance on land; rats for the more local, epidemic spread of plague.
2. Seasonal influences are little marked. Nevertheless the acme of an epidemic of plague is usually reached in the cold season.
3. Rats are not, as a rule, infected by *feeding* on material containing plague bacilli, and man is not infected, as a rule, by organisms through accidental lesions of the skin.
4. The rat-flea will attack man.
5. Simond found plague bacilli in the *stomach* and *intestinal contents* of fleas from infected animals.
6. The flea transmits infection from rat to rat, from rat to man, from man to rat, and from man to man, by inoculation.

If one studies Simond's conclusions along with those of the Second Plague Commission, it is not difficult to appreciate how similar they are. No doubt some of his opinions have to be very considerably modified as a result of the work of the Commission, but even then, in the main points, such as the absence of any proof that rats are infected habitually by way of the alimentary tract; the relationship of the rat-flea to infection of rats and man; the actual presence of plague bacilli within the alimentary tracts of fleas caught on spontaneously infected animals; and the fact that the rat-flea will readily attack man, infecting him by inoculation of the contagium into his skin,—the Commission has verified Simond's work, and has controverted the opinion expressed by the First Commission, that "suctorial insects do not come under consideration in connection with the spread of plague."

REFERENCE.

Simond.—*Ann. de l'Inst. Pasteur*, Paris, 1898, pp. 625–687.

CLINICAL RECORDS.

TERMINATION OF PELVIC COLON IN BLADDER: IMPERFORATE ANUS.

By C. A. Adair Dighton, M.B. Edin., *House Surgeon, Peterborough Infirmary.*

A male child was admitted to the Peterborough Infirmary twenty-four hours after its birth. There was no sign of the anus in the normal position. An attempt was made to feed the child with the bottle, but it vomited everything, while urine mixed with fæces was passed at regular intervals by the urethra.

An inguinal colotomy was performed, but in view of the tacking down of the colon to the posterior abdominal wall it was only accomplished with difficulty. For two days the child was much better and ceased to vomit. There then ensued convulsions, terminating in death.

On post-mortem examination the bladder was found to be firm and enlarged, and near the highest part of the fundus there was a slit-like opening leading into the pelvic colon; the lower blind end of the colon was distended, and, when pressed upon, fæcal matter was driven into the bladder. The orifice of communication admitted a No. 7 catheter. The pelvic colon ran across transversely from the sigmoid to the bladder.

The writer is indebted to Dr. Kirkwood, Senior Surgeon, Peterborough Infirmary, for permission to publish the case.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

The Pancreas: its Surgery and Pathology. By A. W. Mayo Robson and P. J. Cammidge. London: W. B. Saunders Co.

Mr. Mayo Robson has more than once promoted the advance of medical knowledge and at the same time achieved high distinction by writing a monograph on a special subject at what may be described the psychological moment. While other workers in the same field are struggling to keep abreast with the knowledge of the day, Mr. Robson launches out with a treatise on the subject with an immediate diffusion of light and learning. It may be assumed that in the case of the stomach, and of the gall bladder and bile ducts, the author had an easier task than is afforded by the subject of the present work. The pancreas has not yielded up its secrets so frankly to the pathologist and to the abdominal surgeon as the organs we have just cited; to a large extent its pathology and the clinical manifestations of its disturbed action are still the subject of controversy, while the treatment of pancreatic disease, even when it is successfully diagnosed, cannot be described as having reached a further stage than that of infancy.

The work extends to over 500 pages. The preliminary chapters are concerned with the comparative anatomy and development of the organ, the minute anatomy of the human pancreas, and the anomalies which it may present. With regard to the characteristic groups of cells known as the islands of Langerhans, the authors are of opinion that the balance of evidence strongly points to their being independent structures related to the control of carbohydrate metabolism which the pancreas undoubtedly exerts. A fairly comprehensive account is given of those interesting structures included under the term "accessory pancreas," while the variations in the pancreatic ducts are fully described and illustrated.

Several chapters are devoted to the "Pathology of the Pancreas," including its chemical pathology, the pathology of fat necrosis and of diabetes. The description of the chemical pathology is largely confined to the condition of the urine and fæces found to accompany disease of the gland, and although the authors have now devoted special attention to this subject for six or seven years, they confess to being conscious that as yet only the fringe has been touched upon, while the value of the so-called pancreatic reaction in the urine, associated with the name of Cammidge, is still under investigation.

The remaining chapters are very much on the same lines as the

Hunterian Lectures on "Diseases of the Pancreas," delivered by Mayo Robson in 1904.

It must surprise the general reader to find that the treatment of pancreatic affections is almost exclusively surgical. While it is true that in the prophylaxis of pancreatic disease medical measures may play a part, for example, in the treatment of duodenal catarrh, or of duodenal or gastric ulcer, or in such conditions as alcoholism or syphilis, the medical treatment of pancreatic disease once it has developed is dismissed in two lines—"care in diet, wet packs to the epigastrium, rest, and mild mercurial purges." After a fair trial of these measures, if the symptoms progress, and the signs of failure in pancreatic digestion and metabolism are manifesting themselves, the question of surgical treatment should be seriously considered.

The operation to be performed in cases of chronic pancreatitis is described in great detail, as is also the additional procedures such as chole-cystenterostomy, which may require to be performed at the same time.

Altogether the book is a very valuable addition to surgical literature. It is handsomely furnished, although unpleasantly heavy to hold, and the illustrations, which are numerous, are a great addition to its value.

A Text-book of Treatment. Edited by R. J. Ferguson, M.D. Part I. "Obstetrics and Gynæcology," by John Campbell, M.A., M.D., F.R.C.S. Eng. London: Sidney Appleton.

It is difficult to know for what class of practitioners this book is intended. For the specialist the information given is too scrappy to be of any real use, and for the general practitioner the description of most of the gynæcological operations can be of little value, as they are merely given in bare outline and can only be fully grasped by those accustomed to operate. The "Obstetrical" sections and those on "Medical Gynæcology" will probably be most appreciated, and they seem to fairly well reflect modern teaching and to sum up shortly the main points in treatment in quite a useful way. The alphabetical arrangement renders reference easy and convenient, and for a busy practitioner who is in difficulties with a case and who wishes to refresh his memory in an emergency, we can recommend the advice here given as safe and sound. We observe that no mention is made of vaginal drainage under "Drainage in Abdominal Section," and it is just incidentally mentioned in the section on "Parovarian Cysts." Under "Suspension of the Uterus" only Gilliam's operation is referred to, and not what is usually regarded as ordinary suspension. We miss any reference to "Rigid Perineum," "Missed Abortion," "Episiotomy," and "Alexander Adams' Operation." The statement that in occipito-posterior positions "the forceps should be if possible avoided" will hardly commend itself to most accoucheurs, as also the opinion expressed that in arrested breech cases "a blunt hook should only be used when there is good ground for thinking that the child is dead."

While the general principles of treatment are on the whole good, many of the details are open to criticism and to difference of opinion. The well-read man will get little satisfaction from this book, while the less experienced may certainly get some useful advice, which if he has common sense to enable him to apply it with effect, will no doubt help him in many circumstances. One would fain hope that to the latter class the directions here given may act as a stimulus to more extensive reading and research, and to the acquisition of that happy ideal of being always able to do and say the right thing, and to meet all emergencies with that cheerful confidence, which only accurate knowledge and wide experience can beget.

Treatise on Diseases of the Skin. By HENRY W. STEIWAGON, M.D., Ph.D., Professor of Dermatology in the Jefferson Medical College, Philadelphia. Fifth Edition. Philadelphia and London: W. B. Saunders Co.

THAT this book has gone through four editions since 1902 is ample proof of its popularity. It is not intended for those just commencing the study of dermatology, as it treats of all known skin diseases with the exception of those which are of very rare occurrence. It can be thoroughly recommended as an excellent book for the use of senior students and practitioners. It deals with the subject in a practical manner, the greatest amount of space being devoted to diagnosis and treatment. The diagnostic characters of the various diseases are well described, and the differential diagnosis, which is always the difficulty in skin diseases, fully discussed. It is this thoroughness and clearness of explanation in the diagnosis which makes the book especially valuable. An understanding of the lesions is very much facilitated by the great number of illustrations, of which there are over 300. The coloured plates (nine in number), with the exception of those of infantile eczema and primary syphilis, are not very successful, but the other illustrations from photographs are excellent.

The different methods of treatment of the various diseases are also very fully gone into in a way which would greatly aid anyone consulting the book when in a difficulty over a stubborn case. The writer, besides detailing the methods which he himself uses, deals at length with the methods employed by others, and although special methods of treatment, *e.g.*, X-rays, Finsen light, etc., are described, they are not given undue prominence over the other more easily applicable methods.

Syphilis is fully described, over seventy pages being devoted to it, and all the special methods for its treatment explained. In those days of increased travel and intercommunication between different countries, a knowledge of the tropical diseases is essential for all medical men. In this last edition the descriptions of these diseases have been considerably enlarged, and some diseases added which were not included in the former editions.

There is also a section devoted to the exanthemata and a supplementary section dealing with lesions on the tongue and mucous membrane of the mouth.

The whole book is thoroughly up to date, and though comprehensive does not devote too much prominence to useless details, and, besides being eminently suited for the use of those in general practice, contains much which is of interest to the specialist.

Surgical Diseases of the Chest. By Carl Beck, M.D., New York.
London: Rebman Limited.

In the preface to this pretentious work the author invites a comparison with Mr. Stephen Paget's classical monograph, which, to do Mr. Paget justice, we confess would never have occurred to us. "But," says Dr. Beck, "since the publication of his book, which bears the date of June 1896" (in the bibliography it is given as 1897), "three great factors (bacteriology, asepsis, and the Röntgen method) have arisen which have transformed the character of surgical work to such an extent that many traditions and theories had to be discarded." Waiving for the moment the question of the author's historical accuracy, we at once admit that we find no evidence in the volume before us of the great revolution in thoracic surgery which these factors are alleged to have brought about. It is true that many of the pages of this work are occupied by radiographic representations in which the legend tells us that thoracic lesions are illustrated, but we are far from convinced that the space is profitably occupied.

We will not stop to comment on the sections dealing with "Hodgkin's Disease," "Scoliosis," "Surgical Technique in General," "Burns of the Chest Wall," "Subphrenic Abscess," and "Diseases of the Breast." Together they occupy fully one-third of the volume, and they seem to us to have no proper place in a treatise on "Surgical Diseases of the Chest." When we add that over fifty pages are taken up with purely anatomical descriptions, it is evident that nearly one-half of the work —it extends to 350 pages—is occupied with matter outside the title. The author's want of a sense of proportion is further shown by the fact that the subject of mediastinal tumours is disposed of in six lines, inflammatory conditions of the mediastinum in ten lines, and affections of the thoracic portion of the œsophagus are not referred to.

For the rest, we can only say that, with the exception of the sections on Empyema, the descriptions offered are quite inadequate for a special monograph such as this professes to be. Where the author's style is not slipshod, it is bombastic—witness the last paragraph on p. 169— and there is scarcely a page that does not contain its solecism. In a bibliography which extends to seventeen pages we find (save in a long list of the author's own publications, many of which have no relation to the surgery of the chest) only one reference to a paper as recent as 1904, a few are dated 1902, and the great majority are of earlier date.

We cannot recommend this work to any class of readers.

An Index of Treatment. By various Writers. Edited by Robert Hutchison, M.D., F.R.C.P., and H. Stansfield Collier, F.R.C.S.
Bristol: John Wright & Co.

The names of the editors and the list of contributors to this work are sufficient guarantee that the information contained in it is of a high standard of excellence. The teaching is representative of the most advanced English and Scottish schools, and reflects the most modern views on medical and surgical therapeutics. In a work of reference designed for busy practitioners it is natural that medical matters should predominate, but non-operative surgical measures have been duly described, and minor or emergency operations are also included. To this class we would scarcely admit, however, the operation of excision of the semilunar cartilages of the knee, described in considerable detail at p. 457, nor can we subscribe to much that this somewhat wordy article contains. The management of labour has been considered outwith the province of the "Index."

We have on many occasions tested the value of this work when in doubt and difficulty, and from experience can cordially recommend it as a safe and reliable source of guidance.

The Diseases of Infancy and Childhood. By L. Emmett Holt, M.D. Fourth Edition. London: Sidney Appleton.

It is long since Holt's work on "Diseases of Children," by reason of its sterling merits, has gained for itself the reputation of being one of the standard books on the subject. Proof of its popularity is furnished by the fact that in a few years three large editions of the book have been exhausted, and the need for the publication of a fourth has arisen.

With the exception of the section devoted to the consideration of "Infant Feeding," the present volume is practically a reprint of the third edition, a review of which recently appeared in our pages. The chapter on "Artificial Feeding" has been considerably simplified and condensed, and many of the complicated tables and formulas relating to percentage feeding, at one time so strenuously advocated by American writers, have been omitted.

The book, which is largely the outcome of the author's personal experience, is a monument to his industry and energy, and it ought to have a place in the library of every practitioner as a reliable work of reference.

The Operations of General Practice. By Edred M. Corner, F.R.C.S., and H. Irving Pinches, M.R.C.S. London, etc.: Henry Frowde, Oxford University Press.

This is a book which should fulfil a useful purpose. Only a small percentage of students can after graduation obtain hospital surgical appointments. Those who are unable to do so have often had comparatively little opportunity of seeing some of the minor operations of surgery, and still less of learning many points which form almost the daily routine of a house surgeon. In consequence, the general practitioner may err in two directions, either by not venturing on operations which he might easily perform, or by attempting cases where a good result would require all the skill of a specialist. Little fault can be found with the selection of operations included in the book. The authors, in order to keep the size of the book within bounds, have avoided giving alternative methods, and this, they say, "must give a somewhat dictatorial character" to it; the methods they advocate would, however, be accepted by most surgeons. Various other procedures, such as gastric lavage, lumbar puncture, Bier's congestion, and the induction of local anæsthesia, are described. Major operations which a practitioner might under certain circumstances be compelled to perform, as in acute abdominal cases, are purposely left to larger text-books. Some details are given regarding general anæsthesia, and regarding the preparations for an operation which a visiting surgeon would expect. There is also advice to the practitioner who may be suddenly called upon to act as an assistant at a major operation, and who may be apt to commit such "aseptic solecisms" as absent-mindedly scratching his unsterilised nose during an operation—proceedings which, as the authors quietly remark, "detract from the confidence placed in him" by the surgeon! A good point in the book is the emphasis laid on asepsis, the necessity for which is constantly reiterated, faulty aseptic technique in the surgical world being comparable to such an act as eating with one's fingers instead of a knife and fork in the social world.

The book is profusely illustrated, and the only diagrams to which exception can be taken are those representing knees, which are crudely drawn, and the reproduction of a photograph of the suprapubic suction drainage apparatus where the shadows have spoiled the picture. The volume can be most heartily recommended to the general practitioner.

Rotunda Midwifery for Nurses and Midwives. By G. T. Wrench, M.D. London: Henry Frowde, Hodder & Stoughton.

This is a book calculated to fulfil its purpose admirably. In scope and arrangement it does not differ from the usual manuals for nurses. The great difficulty in writing such a book is to know how much to put in and how much to leave out. In this volume the requirements and rules of the Central Midwives Board have been taken as a skeleton of what is demanded of the modern midwife, and whatever one's opinion of the examination by that body may be, there can be no doubt that nurses will find this book reliable as a guide to that examination. We are glad to notice that clear instruction is given as to how much a nurse should do without calling in a physician, and that the outlines of the treatment that will probably be adopted in the various conditions are given only in order that the nurse may be able, and prepared, to render intelligent assistance when the physician arrives.

The whole book is written with an evident enthusiasm which ought to inspire its readers, and which finds expression in a certain breeziness of style not usually met with in such works.

A System of Radiography, with an Atlas of the Normal. By W. Ironside Bruce, M.D., of Charing Cross Hospital. London: H. K. Lewis.

This atlas has been chiefly designed to illustrate the best method of taking radiograms in different parts of the body, and to provide a complete series of radiograms of the normal skeleton. All the radiograms in the atlas have been taken with the tube placed below the couch, as any part of the body can be examined from below upwards without placing the patient in an irksome attitude. A description is given of the author's apparatus and method of taking the radiograms, and it may be said that it appears to serve its purpose admirably.

In the atlas there are radiograms of twenty-seven different positions, and in each position there is a radiogram at the age of 5, another at the age of 15, and another at the age of 25 years. When it is understood that those here produced have been taken under ordinary conditions and without re-touching or alteration of size, we can congratulate Dr. Bruce most heartily on the success of his method; for the illustrations are of the highest degree of excellence, as well as being of the greatest possible utility both to the anatomist and to the surgeon.

Laboratory Studies in Tropical Medicine. By C. W. Daniels.
Second Edition. London: Bale Sons & Danielsson.

Compared with the first edition, this issue is marked by a considerable increase in size, the various chapters have been revised and rearranged, many new illustrations have been added, and the work brought thoroughly up to date. The coloured plates still rank among the best to be found in any book on tropical diseases published in this country.

On the other hand, it is unfortunate that many of the features which so seriously impaired the value of the first edition are still in evidence. Among these may be mentioned the apparent inability of the author to present to his readers, in a clear, concise form, the knowledge he undoubtedly possesses.

To take one example: in the preface it is stated that the book is primarily intended for "the lonely worker in his private laboratory." In the tropics Leishman's stain is more frequently employed than any other. Should such a worker turn to this book for instruction in the use of the stain, he would discover that instead of finding the necessary information clearly and consecutively set forth, he would require to turn to about ten different parts of the book. Even then he would not learn all he should know to ensure good results, under varied conditions, as many important points concerning the use of the stain are left unmentioned. Although the book contains much valuable information, the worker in the tropics who expects to find it a complete and reliable guide in laboratory methods will probably suffer occasional disappointment.

NOTES ON BOOKS.

AMONG the publications of Cornell University Medical College are the *Studies from the Department of Neurology*, vol. ii. of which has reached us. They are simply collected reprints for the most part of papers which have been published elsewhere previously; there are fifteen in all, seven by Dr. Charles L. Dana, six by Dr. J. Ramsay Hunt, and two by M. G. Sclapp, all on the staff of the college. One new paper by Dr. Dana deals with "Para-epilepsy and Psychalepsy," a group of functional neuroses, characterised by periodic psychical, vertiginous, and sensory seizures—resembling, in fact, the prodroma and aura of epilepsy, yet the attacks are not epileptic, neither are they forms of migraine or hysteria.

Dr. C. F. Fothergill has published a little book entitled *Blood Examination and its Value in Tropical Disease* (H. Kimpton, London), but exactly who it will serve we fail to see. The value of blood examination is impressed on one by the numerous short notes of cases which he cites, but there is little of value to those who know anything about blood examination; while for those who do not, but who might be brought by reading this paper to wish to, there is even less, since technique and recognition of the various blood conditions are left severely alone.

Dr. Barton's *Guide to the Administration of Ethyl-Chloride* (H. K. Lewis, London) has reached a second edition. A careful perusal of this little work should convince one that, simple though its administration may be, it is not a matter to be lightly undertaken without some training. He describes fully the ordinary methods of administration, the various means by which anæsthesia can be prolonged (but he advises it should never be beyond ten minutes), and the type of case and operation suitable for its use. The use of ethyl-chloride, as a preliminary to ether and chloroform, is also considered, but preference is given to a method hit upon by the author, namely, C.E. mixture, ethyl-chloride, chloroform sequence. As a warning, the book closes with notes on unsatisfactory cases.

Dr. Wyllie of Hull has written a little book on *Tumours of the Cerebellum* (H. K. Lewis, London), which, as he states, is based upon an analysis of a large number of recorded cases and consultation of the works of various English writers. The larger part deals with the symptomatology and diagnosis; the pathology is just touched on, and under treatment the actual technique of surgical operation is intentionally omitted. We notice that amongst the authorities consulted there is no reference to a monograph on "Cerebellar Tumours" published by five American authors in 1905 (Mills, Frazier, etc.). For further information of the surgical aspects this should be consulted. Dr. Wyllie notes the frequent presence of nystagmus, and lays stress on it as a very frequent symptom of cerebellar tumour. We agree it may frequently be present, but it is unreliable as a cerebellar sign. We can heartily recommend this summary for the use of the student or practitioner with a dubious case for diagnosis.

In *Light and X-Ray Treatment of Skin Diseases*, by Malcolm Morris, F.R.C.S.Ed., and S. E. Dore, M.D. (Cassell & Co., London), we have a careful statement of the principles, technique, and therapeutic effects of treatment by light, X-rays, radium, and high-frequency currents. The authors quote the histological changes caused by these agents on healthy and on pathological tissues, and give the results of their wide clinical experience. In many conditions the results are far in advance of those obtained by any other method, but there is a tendency to send wholly unsuitable cases to the specialist in this department. There will be found in this book an impartial review of the successes and limitations of this branch of therapeutics, which makes it one of the very best treatises on the subject.

The large amount of new material which this, the twenty-sixth volume of the *Medical Annual* (John Wright & Co., Bristol, 1908), contains, affords satisfactory evidence of the progress which is being made in all branches of medical practice, and of the incorporation of this progress in the "Annual." The method of treating bacterial infections by the artificial induction of hyperæmia and the diagnostic and therapeutic uses of tuberculin are satisfactorily described. The illustrations include a series of micro-photographs obtained from examination of the fæces and Killian's direct methods of examining the larynx, trachea, and bronchi. The volume appears to fully maintain the standard of its predecessors.

This somewhat belated volume (*Transactions of the Glasgow Obstetrical Society*, Vol. V., 1904–06) contains many papers of interest. The more outstanding of these have seen the light ere this in the journals. Five of the papers deal with the subject of ectopic gestation, including the descriptions of two extra-uterine pregnancies at full term, and of one case of ovarian pregnancy. Of the gynæcological papers the most interesting is perhaps the discussion on perineorrhaphy, which was opened by the honorary president, Dr. C. J. Cullingworth. Dr. Nigel Stark contributes an interesting note on a case of prolapsus uteri in a virgin.

This (*Transactions of the American Gynæcological Society*, Vol. XXXII.) is a massive volume of 570 pages, which testifies to the enthusiasm and energy of the Society. Most of the papers have already met the eye in the medical periodicals of the United States and Canada. To enumerate those worthy of study would be to reproduce in large measure the index. Of the obstetrical papers one of the most interesting is Dr. King's article on the method of version by posture in transverse presentations. More is likely to be heard of this subject as the method is tried by the various authorities. The principles of abdominal surgery are dealt with by various authors, particularly the closing of the abdominal wound, and the subject of after-treatment. The diagnosis and treatment of surgical diseases of the kidney are discussed by Edebohls, Kelly, and others. Taussig of St. Louis has an interesting article upon the "Bacteriology of the Female Urethra and its Etiological Influence on Cystitis in Women."

This volume of *International Clinics*—Vol. LV. Seventeenth Series (J. B. Lippincott Co., London)—contains a number of interesting papers dealing with a wide variety of subjects. New methods of diagnosis and treatment are illustrated by such papers as "The Action of Injections of fresh Blood Serum in Blood States that give rise to Hæmorrhage," "Five Years' Experience with an Anti-typhoid Serum," "The Ophthalmic Reaction to Tuberculin" (by Professor Calmette) "Thiosinamine for the Treatment of Deafness."

This volume—*Transactions of the American Surgical Association.* Vol. XXV. (W. J. Dornan, Philadelphia)—is edited by Richard H. Harte, Recorder of the Association, and contains a large number of important papers on subjects of current interest. "Carcinoma of the Breast" is reported upon by surgeons in different parts of the United States, including Halsted, Greenough, Simmons, Barney, Cabot, Munro, Dennis, Willy Myer, Lewis Pilcher, Vander Veer, Ochsner, Jacobsen, Oliver, Jonas, and Ransohoff; "Diverticulitis of the Sigmoid Colon" is reported upon by Mayo and by Brewer. Messrs. Porter and White record a "Case of Multiple Carcinomata, following Chronic X-ray Dermatitis."

This—*Transactions of the Clinical Society of London.* Vol. XL. (Longmans, Green, & Co., London)—is the last volume of the series, for the Society has now been merged in the Royal Society of Medicine. The Society, founded in 1867, with Sir Thomas Watson as its first President, can look back upon forty years of useful work. The *Transactions* contain a large mass of valuable clinical records, the usefulness of which will long outlast the existence of the Society. Among its special reports that on Myxœdema is perhaps the most widely known, and this disease will always remain closely associated with the name of the Clinical Society, before which it was first described in Sir William Gull's classical paper. The present volume contains a large number of interesting papers and some excellent illustrations and skiagrams.

Although "The New Library of Medicine" is designed to meet the wants of laymen as well as doctors, Dr. Schofield, who has written *Functional Nerve Diseases* (Methuen & Co., London), which forms the latest volume of the series, addresses himself chiefly to a professional audience, and it is doubtful whether the book will be any more intelligible to the laity than an ordinary medical treatise. Dr. Schofield's point of view is already well known in medical circles, and here he again reiterates the necessity for a wider recognition of the psychic factor both in the production and cure of functional disorders. After an introductory chapter on the psychology of mind, which, except for showing that the author adopts the dualist position, does not throw much light on the matter, the etiology of nerve diseases in general, and the clinical manifestations of hysteria and neurasthenia, are discussed. We did not notice any particular reference to the theory that hysteria is due to a disintegration of the personality, as Morton Prince and others suppose. By far and away the best part of the book is the section on treatment, though, *pace* the author, there is less about the actual practice of suggestion, which we understand to be an essential part of psychotherapeutics, than we should desire. The description of the details of the rest cure, and the hints on the general management of nervous patients, are really excellent and to the point, and the book is well worth reading for them alone. The chapters on etiology and symptomatology do not reach nearly so high a level, and contain a number of very debateable statements, such as that parental alcoholism is a cause of imbecility in the children, and that imitation is a cause of chorea—a hoary fallacy long since dead, and, we had hoped, buried beyond resurrection. Dr. Schofield, however, has paid earnest attention to the subject of functional nervous maladies, he writes in an interesting manner, and his book will have many readers.

One of the first fruits of the recent amalgamation of the metropolitan medical societies is the publication of the *Proceedings of the Royal Society of Medicine* (Longmans, Green, & Co., London), of which the second and third parts of vol. i. are before us. They contain full reports of the communications and discussions at the various sections, and are thus of a many-sided character. The contributors to the two parts are so numerous that it is impossible to refer to all the papers, and, without wishing to appear invidious, we would simply mention as among the most important the discussions on pneumonia and on X-ray diagnosis of thoracic diseases, Dr. Russel's paper on "Epilepsy," Dr. Shattuck and his co-workers' paper "On the Relation of Avian and Human Tuberculosis," Dr. Austin and Dr. Grünbaum's paper "On the Oculo-reaction," and the neurological contributions generally. The sections represented, besides those enumerated, are Epidemiology, Laryngology, Otology, Dermatology, Surgery, Gynæcology, Odontology, and Therapeutics; so that the range of topics is a wide one. The reports are well printed and illustrated, and are in every respect a valuable addition to English medical literature.

The fifth volume of the *Mount Sinai Hospital Reports* covers the work done in the institution during the years 1905 and 1906. It is to a large extent composed of statistical tables, and, judging from these of the wealth of clinical material the hospital affords, one cannot help sharing the regret of the staff that it is not as yet available for the instruction of students. A number of interesting case records are published in the volume, and there are also several papers on more general subjects—Lumbar puncture by Herman and Bernstein, the quantitative estimation of purin bodies in the urine and of iron in organic fluids by Rudisch, as well as a series of articles on bacteriological subjects and on the technique of blood examination from the laboratory of the hospital.

In preparing *Stray Leaves and Some Fruits on Cancer and Tuberculosis* (W. Mate & Sons Ltd., Bournemouth), Dr. M'Culloch has relied for his facts on the labours of others: his theories are his own. So far as we understand his thesis, he believes that cancer is due to a non-toxic protozoal form of cell life, and that its cure by a vaccine will some day be made possible. The cogency of the reasoning which is devoted to the elaboration of this and a number of other hypotheses, is marred, and the hypotheses themselves clouded, by obscurities of language and eccentricities of punctuation, which in many places go far to render the author's meaning incomprehensible. For this reason we offer no criticism, fearing lest we should misrepresent Dr. M'Culloch, but leave his essay to the judgment of those interested.

They are a very small, though fortunate, minority, who cannot claim personal experience of *mal de mer*, hence *Sea Sickness, its True Cause and Cure*, by H. Norman Barnett, F.R.C.S. (Baillière, Tindall, & Cox, London), will have almost as many competent critics as readers. Dr. Barnett argues that sea sickness is due to irritation of the terminal fibres of the auditory nerve in the semicircular canals, and it seems to us that he urges his point with much cogency. From personal experience (unfortunately) we can endorse all that he says as to the nature of the symptoms, and only wish we could feel as certain that they are preventible by bromide as that they are due to stresses in the endolymph. Dr. Barnett's results, however, are encouraging: 95 per cent. of cures, 4 per cent. refractory, and only 1 per cent. incurable. The method is at least worthy of trial.

Those whose lot it is to sojourn in India will find a great deal of useful information in *Remarks on Bazaar Medicines and Commoner Medical Plants of India*, by E. T. Waring, C.I.E., M.D., edited by C. P. Lukis, M.D. (Sixth Edition. J. & A. Churchill, London). The book is intended for the laity—missionaries, civilians, and the like—as well as European and native medical men and dispensers. It contains an alphabetical list of simples, with their properties and uses, such as are readily procurable in any Indian bazaar. There is in addition an index of diseases and their treatment, and an appendix on snake poisoning, drowning, etc. It is nearly half a century since the first edition saw the light, and we should imagine that the book enjoys a popularity as great as its length of days. It is a species of Buchan's "Domestic Medicine," and we should certainly regard it as a useful addition to the equipment of a practitioner going East, if for no other reason than that lacking it he would be entirely ignorant of the mysteries of the Indian domestic medicine chest.

Those who require an advanced ambulance hand-book can scarcely do better than procure Drs. Warwick and Tunstall's *"First Aid" to the Injured and Sick* (John Wright & Co., Bristol), which we have found a thoroughly concise and accurate text-book on the subjects usually covered by a series of ambulance lectures.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF
J. S. FOWLER, M.D., F.R.C.P.Ed.,
PHYSICIAN, ROYAL HOSPITAL FOR SICK CHILDREN.

The Specific Tests for Tuberculosis.

The introduction last year of the several clinical tests for tuberculosis associated with the names of Calmette, Wolff-Eisner, and Pirquet, one of which—the oculo-reaction—was reviewed in the October number of this Journal, has produced a perfect flood of writing on the specific tuberculin reactions. A number of new facts have come to light, and in reviewing them here, the usual custom of abstracting individual papers has been departed from, in order to avoid unnecessary repetition.

Four tests, or rather three and one modification, have all found numerous advocates—(1) The *oculo-reaction*, or conjunctival reaction, the special features of which have already been referred to. (2) The *cutaneous reaction* of Pirquet. This is carried out (1) by placing on the skin a 25 per cent. solution of old tuberculin and scarifying the epidermis through it, as in vaccination. If weaker solutions are used, there are a larger number of negative results. At the same time a control vaccination with saline solution is performed. A positive reaction shows itself within six or eight hours, and attains its maximum in about twenty-four hours. According to the severity of the reaction, a papule surrounded by a variable zone of erythema develops. The reaction usually subsides in a day or two. There is sometimes vesiculation, and occasionally slight pigmentation after the papule has disappeared. (3) The *subcutaneous reaction* ("*stich-reaction*"). Hamburger (2) supports this as the most certain method of diagnosing tuberculosis. The injection of 1 mgrm. of old tuberculin under the skin of a tuberculous individual produces local swelling and redness; sometimes much smaller doses ($\frac{1}{10,000}$ to $\frac{1}{100}$ mgrm.) also give the reaction. (4) Moro's *salve reaction* (3) is simply a variation of the cutaneous reaction. He finds that if an ointment consisting of 5 c.c. old tuberculin, and 5 grms. anhydrous lanoline be rubbed into the skin of a tuberculous subject, slight dermatitis ensues. Heinemann (4) has tested this on a series of patients, and shows that it gives practically the same results as the instillation of tuberculin into the eye, without the discomfort attending the latter. The test requires no further mention.

Before discussing the relative merits of the tests, some general points, which crop up so frequently in the articles on the subject as not to demand exact reference, may be mentioned. Nearly all the authors speak favourably of their reliability. Almost the only exceptions are Olmer and Terras ([5]), who appear to have been unfortunate in getting eleven negative results out of thirty-one trials on tuberculous adults with Pirquet's test. It is unanimously agreed that all the tests fail in *advanced cases of tuberculosis*, in *general miliary tuberculosis*, and in *tuberculous meningitis*. Pirquet's test (the cutaneous reaction) differs from the oculo-reaction in this respect, that a large number of clinically healthy adults (up to 80 or 90 per cent. according to some observers) react positively, this being much higher than in the case of the oculo-reaction. The test is, therefore, chiefly valuable in children under 2 years. This difference in delicacy is explained by Mainini ([6]) and others, on the assumption that a positive cutaneous reaction is evoked by *any latent deposit* of tubercle, while for a positive oculo-reaction an *active focus* is required. This supposition is scarcely justified; all that we can say is that the cutaneous reaction is so delicate as to be robbed of much of its value as a diagnostic of clinical tuberculosis in the adult. In performing Calmette's test it is very important to assure oneself that the eyes are healthy, otherwise inconvenience may follow.

Statistics of the oculo-reaction.—Collating the results given by Moro, Heinemann, Mainini, Schröder and Kaufmann ([9]), Damask ([10]), Blum ([11]), Cohn ([12]), Levi ([13]), Schenk and Seiffert ([14]), and Wolff ([15]), we find that of 404 tuberculous persons, 327 gave a positive reaction; of 215 patients suspected of tubercle 130 gave a positive reaction; of 716 patients clinically non-tuberculous 123 reacted positively. These figures relate to adults; for children we have Audeoud ([7]) and Machard ([8]). Of 290 tuberculous children 271 reacted; of fifty suspects, forty reacted; of 310 non-tuberculous, twenty-six reacted. The percentage of positive results in adults, tuberculous, suspect, and non-tuberculous respectively, are 80, 60, and 17; in children, 93·4, 80, and 8·4. It seems, therefore, that the test is one on which both positively and negatively a considerable degree of reliance can be placed, particularly is children below the age of 12.

Statistics of the cutaneous reaction.—For adults, collating Mainini, Wolff, and Goebel ([16]), we have tuberculous persons ninety-six, of whom eighty-four reacted; suspects, 195, of whom 137 reacted; clinically non-tuberculous, 128, of whom 101 reacted. As to children, Goebel, Ferrand and Lemaire ([17]), Bing ([18]), and Pirquet give 128 tuberculous with ninety positive reactions; sixty-eight suspects with forty-four positive reactions; and 93 non-tuberculous with fifty-seven positive reactions. The percentage in this case are 87, 70, and 80 for adults; 70, 66, and 19 for children.

Comparisons of the two tests, and of both with the results of injections of tuberculin, have been instituted by several observers. Wolff, who is a partisan of injections, which are not, he asserts, dangerous, found that, taking doubtful cases of tuberculosis, a much larger proportion reacted definitely to injections than to either the Calmette or

Pirquet test. He found on X-raying a number of suspicious lung cases which had not given the cutaneous reaction, that changes could be detected in the thorax notwithstanding. His method of applying the tuberculin test is to begin with $\frac{1}{10}$ mgrm., increasing to 1, 2, 5, or 10 mgrms., with two-hourly temperature observations. Ferrand and Lemaire found that the result of the cutaneous reaction, whether positive or negative, was confirmed by the ophthalmo-reaction in twenty-nine out of forty-nine cases; it was confirmed by tuberculin injection in thirty-four out of thirty-nine cases. It is not very easy to compare the results of different observers, owing to the different methods of control they have adopted, but the general result seems to be that both subcutaneous and cutaneous inoculation are much more delicate tests than the oculo-reaction, and that their usefulness is somewhat detracted from by the fact that they reveal the latent or obsolete tubercle which apparently lurks in so many clinically healthy adults in a much greater degree than does the oculo-reaction.

Differential tuberculin reactions.—Attempts have been made by these new methods to differentiate between the infection of man with the human and the bovine tubercle bacillus. Detri ([19]), after quoting statistics on the frequency of bovine infection (out of fifty-six post-mortems forty-nine showed the human, five the bovine, and two both forms of organism), states that he obtained a greater reaction to bovine than human tuberculin in two out of twenty cases under treatment. He then began to work on the same lines, but applying the cutaneous reaction, vaccinating with — (*a*) Old tuberculin, (*b*) 10 per cent. old tuberculin, (*c*) Denys's original tuberculin, (*d*) filtrate of human tubercle bacilli, and (*e*) filtrate of bovine bacilli. (*a*) and (*b*) was designed to settle whether the degree of concentration affected the reaction; (*d*) and (*e*) the nature of the infection present. The individuals who had reacted most markedly to injections of bovine tuberculin also reacted most markedly to vaccination with the bovine filtrate. Some cases gave an equal reaction to both (*d*) and (*e*); the "human reaction" was most frequent in tuberculosis of the lungs and glands, the "bovine reaction" in osseous tubercle. Kentzler ([20]) applied the same method in 201 cases, and arrived at the conclusion that it was not likely to lead to results of practical benefit. His grounds for this are that only a small percentage of tuberculous cases (by ordinary tuberculin test) react to filtrates of bovine and human bacilli. Without giving all his figures, the following will suffice as an instance:—Ninety-eight cases certainly tuberculous—tuberculin test positive, 76 per cent.; human filtrate positive, 26 per cent.; bovine filtrate positive, 14 per cent.

Prognostic value of tuberculin reactions.—The general impression is that the intensity of these reactions is to some extent inversely proportional to the severity of the disease. Detri regards the disappearance of response in a patient who has previously reacted as ominous. Wolff-Eisner and Teichmann ([21]) have paid special attention to this aspect of the question. They hold that the cutaneous reaction has a typical course, which depends on the gravity and progress of the disease. They divide the reaction into three groups:—(i.) *Marked reaction*, which sets in within four to six hours after inoculation, and reaches its height twenty to twenty-four hours later, and diminishes at the third or fourth day. This occurs in incipient tubercle, and in the first and second stages of favourable cases. (ii.) *Mild reaction*, beginning about six hours after inoculation, reaching its acme in ten hours, and disappearing on the second day. This is characteristic of the third stage of tuberculosis, and of bad cases in the first and second stages. (iii.) *Late and continued reaction*, beginning about six hours after inoculation, reaching a height very slowly, and persisting for a week. This is met with in patients who show no clinical signs of tuberculosis. Of the oculo-reaction, only the first and second types are met with.

Effect of repeated inoculations.—If in a suspicious case the test is negative or doubtful, it is the natural impulse to try it again, but to do so introduces a complication of rather a curious nature. This is bound up in the question of super-sensitisation, or anaphylaxis, a phenomenon which has been extensively studied in connection with "serum disease," and which for the present purpose we may define as an increased sensitiveness to the second and subsequent inoculations with a serum. Pirquet suggests the term "Allergie" to denote this increased sensitiveness, and "Allergic tests" have been employed in a number of cases. Ferrand and Lemaire are among those who report the recurrence of the ophthalmo-reaction, on a curative dose of tuberculin being given weeks after the test has been applied. Klieneberger (22) found that on a second test being applied 76 per cent. of the clinically non-tuberculous show the ophthalmo-reaction. Dufour (23), however, found that two successive instillations into different eyes always yielded concordant results, though the second reaction might be more severe; with two successive instillations into the same eye, the first being negative, the second was sometimes positive; with three or more instillations the first being negative, the later ones were sometimes positive on the same eye, but not in the opposite one. Anaphylaxis is therefore local.

Is the oculo-reaction free from danger?—Many German writers have reported severe conjunctivitis, etc., following Calmette's test, and most of them speak warningly on the subject. "Scrofulous" children are especially liable. Possibly, however, this preponderance of bad results is due to the fact that Höchst's dry tuberculin is tenfold the strength of Calmette's preparation (9). Lapersonne (24) states that the conjunctivitis is usually due to saprophytes; the Koch-Weeks bacillus was only once found. It should be treated with weak argyrol. He has seen persistent lachrymation, pannus, and keratitis followed by irido-cyclitis after the test. If there has been any ulceration of the cornea the reaction is very likely to provoke a relapse. The usefulness of the test in ophthalmic work is therefore limited. It should be employed sparingly in the aged.

To complete this review, one or two other miscellaneous points may be touched upon. The reaction is relatively often *positive in typhoid patients* (Damask and others). The numbers are, however, few. The *lesions of the skin* are said to be characteristic, and cannot be reproduced by mechanical or chemical irritants (Ferrand and Lemaire). *The cytology of the exudate* has been studied by Lafon (25), who finds that there is a more marked polymorphous leucocytosis than in conjunctivitis, and thinks this may decide doubtful cases. Various attempts have been made to utilise these tests to shorten the time required to determine the result of diagnostic animal inoculation, but without success. Cattle react; rabbits react in six or eight weeks ([26]), guinea-pigs do not respond either to Pirquet's or Calmette's test ([27]).

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SURGERY.

UNDER THE CHARGE OF

ALEXANDER MILES, M.D., F.R.C.S.Ed.,

LECTURER ON SURGERY, SCHOOL OF MEDICINE, EDINBURGH.

THE SITE OF AMPUTATION IN SPONTANEOUS GANGRENE OF THE EXTREMITIES.

WILMANS (*Centralbl. f. Chir.*, Leipzig, 1908, March 29) records the details of 174 cases of senile and diabetic gangrene treated by amputation, and they go to show that although low amputation entails the risk of gangrene occurring in the stump, the proportion of ultimate recoveries is considerable. In any given case the question of whether the amputation is to be carried out high above the gangrenous area, or near to it, must not be decided on the permeability or closure of the popliteal artery alone, for, on the one hand, although this artery may be completely occluded the collateral circulation may be sufficiently free to nourish the flaps; and, on the other, in spite of the permeability of the popliteal artery the gangrene may spread after amputation, as a result of venous thrombosis.

Spontaneous gangrene depends on insufficiency of circulation, and this may be dependent on the power of the heart as well as on the local changes in the blood vessels, both arteries and veins. Wilmans is of opinion that in deciding the level at which to amputate, more stress should be laid on the strength of the heart's action, and on the nature of the process of demarcation. If the line of demarcation forms rapidly and decidedly, there is probably a sufficient circulation above it to admit of low amputation being performed with safety. If, however, it forms slowly, undecidedly, or does not form at all, then it must be assumed that the circulation is very defective, and high amputation is compulsory. The capacity of the heart should be increased, if possible, before operating.

On Bennett's Fracture of the Metacarpal of the Thumb.

A valuable contribution to the literature of fractures of the metacarpal of the thumb is made by Samuel Robinson (*Boston Med. and S. Journ.*, 1908, February 27). From the year 1881, when E. H. Bennett first described the fracture which is associated with his name, till 1904, when a paper appeared in these pages, comparatively little attention was paid to this lesion. The increasing use of the X-rays in the diagnosis of inquiries about the fingers and wrist has, however, aroused a fresh interest in the subject, and although remarkably little has been added to our knowledge of the particular lesion described by Bennett, who, of course, had not the benefit of radiographic observation, we have learned a good deal regarding similar lesions with which it is liable to be confused clinically. The object of Robinson's paper is to show that Bennett's fracture is not the most common lesion of the first metacarpal. From an examination of ninety-two radiograms of fractures of the metacarpal of the thumb, he finds that only twenty-eight were of the true Bennett type, *i.e.* a fracture of the palmar projection of the base, involving the articulation with the trapezium and accompanied by "subluxation" of the long fragment towards the dorsum. In the other sixty-four, the fracture was more or less transverse, and passed through the shaft near the base, but without implicating the joint or being attended with subluxation. The importance of this observation lies in the fact that the two lesions call for different forms of treatment. In Bennett's fracture, the maintenance of extension on the shaft until the separated palmar fragment has sufficiently united to prevent recurrence of the subluxation, is essential; while in the other type this precaution is unnecessary. The author describes a method of securing the necessary extension which he has found efficacious.

Ludwig's Angina.

In an exhaustive paper, T. Turner Thomas (*Univ. Penn. Med. Bull.*, Phila., 1908, March) discusses that form of cellulitis of the submaxillary region first described by Ludwig in 1836, and comes to the following conclusions:—The condition is a rapidly spreading cellulitis, beginning in the region of the submaxillary salivary gland as a perilymphadenitis, and extending to the floor of the mouth and pharynx. The primary focus is usually some neighbouring surface lesion, such as a carious tooth, tonsillitis, or ulcer of the mouth. The infecting organism is usually the streptococcus, alone or mixed with other pyogenic bacteria; sometimes the staphylococcus alone is present. Death results from invasion of the larynx in most cases, and in a considerable number the lungs also are involved. The associated septic intoxication is probably no more severe than that which results from streptococcus infections of the same grade in other parts of the body. The opening in the muscular bucco-pharyngeal wall, through which the submaxillary salivary gland projects into the floor of the mouth, is the path by which the submaxillary infection invades the mouth and pharynx, and it is this invasion of the floor of the mouth and the pharynx which determines the alarming symptoms characteristic of Ludwig's angina. The pathological changes in the infected area do not differ materially from those of any severe pyogenic infection occurring under similar anatomical conditions. The proximity of the alimentary canal explains the frequency of gas and putrescence in gangrenous cases; while the intensity of the inflammatory process and the compression of the inflammatory material inside the jaw and under the tongue accounts for the frequency of gangrene.

The condition is sufficiently constant in its clinical course to deserve a place as a morbid entity. Early treatment on modern lines has diminished the severity of the symptoms. The treatment recommended is by incision over the submaxillary triangle and parallel with the lower border of the jaw, with incision of the mylo-hyoid muscles if pus is not found under the integument. The operation should be done under local anæsthesia, to avoid the risk of adding to the laryngeal irritation by giving a general anæsthetic.

The Etiology of Syphilis.

A useful summary of the recent literature bearing on the *Spirochæta pallida* in its relation to the causation of syphilis is furnished by Rosenberger (*New York Med. Journ.*, 1908, February 29). From a study of it and from personal observation he concludes that the general consensus of opinion is that this organism is the probable cause of the disease. He has been able to collect references to 1210 lesions, including congenital syphilis, and in 958 the parasite was present. In 333 chancres examined, 299 gave positive results; in forty-three papular eruptions, thirty-five were positive; in thirty-three mucous patches, twenty-three were positive; and in 122 roseolar rashes, eighty-seven were positive. In the juice of lymphatic glands the spirochæte was found only in six out of twenty-four cases examined. It was present in twenty-two out of thirty-five condylomata. Of 435 cases simply described as "syphilitic," without defining the precise lesion, 361 were positive. The organism was much less frequently found in tertiary lesions, thus in eleven gummata examined it was present only in two, and was not discovered at all in forty-seven cases of tertiary syphilides. In congenital syphilis, on the other hand, the organism was found in 123 out of 127 cases investigated. It is not, however, always generally distributed in all the organs and tissues. It may only be demonstrable in one or two organs, such as the spleen or liver, the kidney or the skin, and then only in certain areas of these structures. It is to be borne in mind that there is a diminution in the number or disappearance of the organism when general or local treatment is resorted to. The examination must therefore be made as early as possible.

CASE OF SPONTANEOUS RUPTURE OF THE GULLET.

AN example of this rare accident is reported by Cohn (*Centralbl. f. Chir.*, Leipzig, 1908, March 21). The patient was a man, æt. 46, a heavy drinker, who, while having his stomach washed out, was seized with violent vomiting, which ejected the stomach tube and a quantity of blood-stained fluid. The patient became collapsed, and suffered severe pain in the epigastrium. In two and a half hours a swelling formed on the right side of the neck, and death ensued four hours after the accident.

On post-mortem examination, a longitudinal tear, 4 cms. in length, was found in the gullet. The wall of the tube was healthy, but there were strong adhesions fixing it to the pleura and diaphragm. Cohn attributes the rupture to the violent vomiting raising the pressure inside the gullet, which was unable to yield owing to the adhesions, while a cramp-like contraction of the walls of the pharynx closed the gullet above and prevented the escape of the contents.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

F. W. N. HAULTAIN, M.D., F.R.C.P.Ed.,

PHYSICIAN FOR DISEASES OF WOMEN, DEACONESS HOSPITAL, EDINBURGH;

AND

J. A. C. KYNOCH, M.B., F.R.C.P.Ed.,

PROFESSOR OF OBSTETRICS AND GYNÆCOLOGY, ST. ANDREWS UNIVERSITY.

ETIOLOGY OF PUERPERAL RETROFLEXION.

R. OLSHAUSEN (*Centralbl. f. Gynäk.*, Leipzig, 1908, No. 1) states that retroflexion in the puerperium is caused by changes in the genital organs. The displacement always occurs after the first confinement, but recurs at subsequent puerperal periods. Occasionally, however, retroflexion is present before pregnancy occurs. In primiparæ the head descends into the pelvis towards the end of pregnancy, so that the walls of the uterus are very much thinned, as shown by the head being distinctly felt through the cervical wall. During labour this thinning is increased. Distension of the bladder prevents the fundus lying forwards, and the dorsal position assumed by the patient favours the falling of the uterus backwards, the thinned tissues offering no resistance. Olshausen recommends that primiparæ should be examined shortly after confinement, to ascertain whether this backward displacement has occurred. If so, it should be rectified, and a pessary inserted. A permanent cure is produced by pessary treatment of recent puerperal cases.

Early Rising after Cœliotomy.

Hartzog (*Centralbl. f. Gynäk.*, Leipzig, 1907, No. 52) advocates allowing patients to rise after two or three days, instead of remaining in bed for two or three weeks. He has treated 150 cases in this way, among which are included all kinds of severe abdominal operations. He believes that it has a better mental effect, allows the bowels to act naturally early in convalescence, and preserves better the strength of the patients. He has had no case of hernia as a result of early sitting up, and the wounds have all healed by first intention. Hartzog does not, however recommend this practice in hernia cases, or in plastic operations.

Pubiotomy and Symphysiotomy.

H. T. Lewis (*Surg., Gynec., and Obst.*, Chicago, 1908, February) states that symphysiotomy is much more easily performed than pubiotomy, and that there is very little difference in the results of the two operations. He does not think that any of the operations for widening the pelvis has a great future. He advocates Cæsarean section as being the best operation in cases seen early, and thinks that the presence of sepsis contra-indicates pubiotomy as definitely as it does Cæsarean section. The choice should be between Cæsarean section and perforation rather than between pubiotomy and symphysiotomy.

Pubiotomy on a Primipara.

Döderlein (*Surg., Gynec., and Obst.*, Chicago, 1908, February) reports the case of a primipara with flattened pelvis, and where the conjugate measured 8 cms., delivered by pubiotomy after repeated attempts with forceps. The open incision was employed. There was considerable venous bleeding, controlled by pressure. The child was delivered with some difficulty after version. The patient recovered, but on the fourth day there was considerable œdema of the vulva, and a temperature of 103°. She was going about in three weeks, and in three months the union was satisfactory. Döderlein thinks there is a distinct indication for this operation in cases where long-continued attempts at delivery have failed and where Cæsarean section is contra-indicated.

Decapsulation of the Kidneys in Puerperal Eclampsia.

Arch (*Centralbl. f. Gynäk.*, Leipzig, 1908, No. 9) reports a successful case. Patient, æt. 21, had the first fit three days after a natural labour. It lasted three minutes, and was followed by others at intervals of thirty to forty-five minutes. The urine contained copious albumin, and the patient remained unconscious between the fits. During the time she was under chloroform she had several shorter fits, but they entirely ceased after operation. She slept quietly, and breathing became regular. In a fortnight later there was no albumin, and the patient left hospital quite well a month after operation.

THE RESULTS OF THE EXTENDED ABDOMINAL OPERATION FOR CANCER OF THE UTERUS.

WERTHEIM (*Centralbl. f. Gynäk.*, Leipzig, 1908, No. 6) reports that among 120 patients operated on for uterine cancer, at least five years ago, the primary mortality was twenty-seven, and six deaths occurred from other causes. Of the remaining eighty-seven cases fifty-one (58·6 per cent.) have remained free from recurrence. The primary mortality in the last 158 cases has only been 7·5 per cent., although the operability of uterine cancer remains at about 50 per cent. of cases seen. Of the 158 cases necrosis of the ureter occurred in ten, and in four cases there was necrosis of the bladder wall.

TETANUS IN GYNÆCOLOGY.

TAYLOR (*Am. Journ. Obst.*, N.Y., 1908, April) reports a case of supravaginal hysterectomy for a fibromyoma of about 5 in. in diameter. The operation was simple and uncomplicated, and the patient was discharged on the sixteenth day. On the forty-second day the patient complained of pain in the jaw, and had difficulty in opening her mouth. Tonic contractions of the muscles of the back followed, the disease became acute, and death occurred on the forty-ninth day after operation. The tetanus bacillus was not discovered in the brain, spinal cord, or elsewhere. Taylor suspects that infection occurred at the time of operation, although the instruments employed had been most carefully sterilised. Boldt remarked that he had met with two fatal cases of tetanus after hysterectomy and ovariotomy. Jewett and Martin each reported a case where tetanus followed within a few days after a plastic operation. Other speakers considered it a mistake to conclude that the ligature used must necessarily be the cause of the infection, as it might come from other sources, and that there was no special cause of tetanus in gynæcological practice.

FEMALE GENITAL TUBERCULOSIS.

MARTIN (*Berl. klin. Wchnschr.*, 1908, January 20) states that the disease is most frequently secondary to an intestinal-peritoneal tuberculosis or a hæmatogenous infection. With regard to its frequency Jung states that 24 per cent. of chronic affections of the uterine appendages are tubercular. In 55 per cent. of the cases, menstruation is unaffected. Pain is an uncertain symptom, but the patients generally feel and look ill. The onset of the disease sometimes takes place in connection with pregnancy. In 66 per cent. of Martin's cases the disease was localised to the appendages; while the affection of the cervix is rare, that of the vaginal mucous membrane is still rarer. With regard to treatment, he recommends excision of the diseased tissue. He gives the results obtained in fifty-three patients.

Three cases of laparotomy died of acute septic peritonitis and five of pulmonary tuberculosis. In 85 per cent. the primary recovery was satisfactory. With regard to ultimate results he gives details of twenty-seven cases. Sixteen were cured, two died of tuberculosis during the first year, six were much improved, two were not cured, and one died of another disease. Martin points out the importance of general treatment, with local treatment of pronounced diseased parts, but where there appears to be any prospect of spontaneous cure such cases are best left alone.

THERAPEUTICS.

UNDER THE CHARGE OF
RALPH STOCKMAN, M.D., F.R.C.P.Ed.,
PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY;
AND
FRANCIS J. CHARTERIS, M.D.,
ASSISTANT TO THE PROFESSOR OF MATERIA MEDICA, GLASGOW UNIVERSITY.

THE EXCRETION OF HEXAMETHGLAMIN (UROTROPIN) IN THE BILE AND PANCREATIC JUICE.

CROWE publishes an interesting series of observations which are likely to prove of considerable therapeutic value, as they indicate that urotropin is able to act as an antiseptic to the biliary passages. By means of experiments on dogs he was able to show that this drug, or its decomposition product formaldehyde, is excreted both in the bile and pancreatic juice. The excretion into the bile takes place partly by the hepatic cells and partly by the gall bladder. The drug is rapidly absorbed and the maximum concentration in the blood is reached apparently four to eight hours afterwards. Excretion is prolonged, as it is still demonstable in the bile and pancreatic juice twenty-four hours after a dose of 1 grm. Observation on human beings with biliary fistulæ gave similar results. The quantity present in the bile is considerable, and it was found that if 75 grs. per diem was given, the drug exerted a distinct bactericidal action. This quantity is required if a rapid action is desired, but possibly smaller doses continued over a longer period may prove equally satisfactory. Thus in one case of distended gall bladder containing pus which gave a pure culture of *Bacillus typhosus*, the daily administration of 15 grs. gave sterile cultures at the end of ten days. In another case, where 75 grs. was given, the growths at the end of twenty-four hours were sterile, though previously they had shown growths of *B. typhosus*. In addition to the excretion in the bile, the drug in man may also be got in the cerebro-spinal and synovial fluids. In a case of gonorrhœal arthritis of the knee, 80 grs. were administered daily for ten days, by which time the fluid in the joint had become sterile. In view of the modern theory that the *B. typhosus* may exist for long periods in the gall bladder after an attack of typhoid fever, it is of considerable importance to know of a drug which can exert a bactericidal action in the gall bladder. Further, it is likely to prove of value in acute inflammation of the gall bladder, and as a prophylactic measure against gall stones and before operations.—*Johns Hopkins Hosp. Bull.*, Baltmore, 1908, April.

The Indication and Contra-indications for Röntgen-Ray Treatment.

In this paper Pick shows how increasing knowledge has led to a great restriction in the application of ray treatment. So far from supplanting surgical methods, ray treatment is now given up in malignant tumours in favour of immediate operation. It is still advocated as a prophylactic method after operation to diminish the risk of local recurrence in the wound and in neighbouring glands. In dermatology the therapeutic indication has also suffered much curtailment. There are indeed only two classes of cases in which it can be said that ray treatment is absolutely the best form of treatment which can be selected. These are parasitic infections of the hairy scalp and lymphoid skin infections. In parasitic scalp infections in most cases we require to remove all infected hairs before we can successfully cope with the disease. For such epilation we have no more certain or less painful method than the Röntgen rays. A single treatment of fifteen minutes with a moderately soft tube causes the hairs in the rayed area to fall out in the course of the next fourteen days, without inducing any serious reaction or permanently damaging the hair follicles. Similarly the rays may be used as an epilatory in acne of the neck. The other absolute indication for ray treatment is found in the cutaneous manifestion of leukæmia, pseudo-leukæmia, mycosis fungoides, and in idiopathic sarcoma. Though the treatment is only symptomatic, it is the most rapidly acting therapeutic measure we possess.

Pick holds that the ray treatment is also of considerable value in certain cases of multiple cutaneous tumours, which are too widely spread to be readily dealt with by surgical means. Thus he has used the rays in cases of adenoma sebaceum and in widely spread warts. In the same category come diffuse infiltrating forms of lupus vulgaris affecting the face, in which operative interference would lead to too much loss of tissue. This is the only form of lupus which he considers should be treated with X-rays. He has found no benefit from them in lupus erythematodes, psoriasis, keloid or sclerodermia, in all of which the rays were at one time strongly advocated.—*Centralbl. f. d. ges. Therap.*, Wien, 1908, April.

The Technique of Restricting the Diet Chlorides.

Since its introduction some four years ago, this method has been advocated in the treatment of certain renal conditions, of diabetis insipidus, and of severe breakdown of compensation in heart disease. Further, it has been advocated to intensify the effect of bromide medication. Strauss points out that most food-stuffs only acquire their chloride content during the process of cooking. It is therefore necessary to cut out those articles of diet which we are in the habit of taking prepared with salt unless we can prepare them in a palatable form without salt. Meat-soups are not easily prepared without salt. These can be replaced by milk-soups, which can be flavoured with sugar. Albumin can readily be given in the form of cheese, or eggs prepared as omelettes, etc. In regard to carbohydrates, the most important thing to arrange is that the bread shall contain no salt. Vegetables as a rule require some salt. They should be boiled with very little salt, and then thoroughly washed in water. Those, such as green peas or carrots, which can be prepared without salt, are of course to be preferred. In cases where the tolerance for chlorides is reduced it is best to allow only a measured quantity in the day, part of which may be used in the cooking of the food. To estimate the power of the kidney, the patient should be put upon a test diet. The restriction of salt is only required in renal cases where there is a tendency to dropsy. In doubtful cases this can only be determined by putting the patient on a known diet containing a moderate quantity of salt, and controlling the urinary chloride excretion and the bodily weight. A dropsical tendency is shown by a rise in weight associated with retention of chlorides. This most frequently occurs in parenchymatous nephritis. Restriction of salt should be reserved for such cases, and then only as long as the tendency to dropsy is maintained. Salt restriction is seldom indicated in chronic cirrhotic kidney disease. In cardiac disease, with tendency to dropsy as a rule merely reducing the total quantity of salt is sufficient. A strict salt-free diet is only required when the venous congestion has induced severe degeneration in the renal epithelium.—*Ztschr. f. Physiol. u. Diät. Therap.*, Leipzig, 1908, April.

MEDICAL JURISPRUDENCE.

UNDER THE CHARGE OF

HARVEY LITTLEJOHN, M.A., B.Sc., M.B., F.R.C.S.Ed.,

PROFESSOR OF FORENSIC MEDICINE, UNIVERSITY, EDINBURGH.

The Presence of Chloride of Ethyl in the Blood during Narcosis.

In the *Compt. rend. Soc. de biol.*, Paris, 1907, No. 38, Camus and Nicloux, in continuation of the already published investigations of the latter, show that chloride of ethyl has a much lower boiling-point than either chloroform or ether, the former being 12·5 C., while that of the two latter is 60·8 and 35·6 respectively. In consonance with the very rapid narcosis produced by chloride of ethyl, it was found that the drug is taken up by the blood with great rapidity. At the commencement of loss of sensibility of the cornea the amount of chloride of ethyl in the arterial blood varies from 25 mgrm. per 100 c.c. of blood upwards. In complete anæsthesia the amount is from 30 to 80 mgrms., and more chloride of ethyl is found in the arterial than in venous blood. The fatal dose could not be definitely fixed. Sometimes animals die when the amount is 45 mgrms. in 100 c.c. of blood, and often only when the amount is four times greater. This depends upon the different methods of administration employed, the duration of the experiment, the strength of vapour inhaled, and the state of the nervous system and of the heart during the narcosis. When measured mixtures are used respiratory difficulties often occur, the respiratory rhythm is accelerated, while the amplitude of the respiratory movements are diminished. In such cases death occurs from defects of the respiratory apparatus, and in such cases the blood may only contain a small amount of ethyl chloride. If, on the other hand, ethyl chloride is administered without admixture of atmospheric oxygen and narcosis is rapidly produced, one may find as much as 200 mgrms. in 700 c.c. of blood. In such cases artificial respiration may soon resuscitate the animal, thus showing chloride of ethyl to be a substance easily eliminated from the blood, and that it does not seriously damage the vital organs.

Chloroform and ether are eliminated with much more difficulty, and the sudden inhalation of a large amount of chloroform is much more dangerous than a rapid increase in the amount of ethyl chloride in the blood.

Chloride of ethyl is a much safer anæsthetic, because even in the case of a profound toxic action occurring, artificial respiration is effective.

The Microscopical Examination of Blood Stains.

At the annual meeting of the German Medico-Legal Society, held at Dresden in September of last year, two interesting and important papers were read dealing with the microscopical examination of blood stains. The first, by Professor Kockel of Leipzig, advocated the examination of blood stains in stained sections, a method which he has employed with satisfactory results. The blood-stained fabric is embedded in paraffin or celloidin, preferably the latter. Small pieces of the fabric are placed directly and without any previous treatment in ether-alcohol for a few minutes, then for some hours in any fluid and afterwards for one to two days in more dense celloidin. In order to facilitate the rapid solidification of the celloidin, the small dish filled with celloidin containing the preparation is placed in a well-closed glass vessel, at the bottom of which there is some chloroform. The chloroform may be renewed in the course of a few hours, and at the end of twenty-four hours celloidin blocks suitable for cutting in a microtome can be obtained. The sections should be placed first of all in 70 per cent. alcohol and then stained for about half an hour in dilute solution of hæmatoxylin, and afterwards in eosin. They are dehydrated in alcohol, cleaned with carbol xylol and mounted in Canada balsam. Staining of the fabric before embedding is not recommended. The advantages of the method are not only that blood corpuscles can be readily recognised by it, as well as the characteristics of the corpuscles, but also it enables one readily to discover and identify minute foreign particles which may be and often are present in blood stains, such as bits of flesh, hairs, etc. The recognition and identification of the origin of these extraneous matters is frequently of great importance in medico-legal cases, and Kockel gives several interesting illustrations. The second paper is by Fränckel, and deals with a method for the microscopic examination of blood stains which was first brought forward by Florence in 1907. This consists in the direct microscopic examination of blood stains on opaque objects by means of reflected light. Florence got the firm of Nachet to construct a specially adapted instrument for him with which he was able to see as well as to photograph blood corpuscles on, for example, a knife blade as clearly as if they were being examined on a glass slide. Fränckel found that this special apparatus was not necessary, and that by means of a Leitz opaque illuminator he was able to obtain equally good results. The technical difficulties which may present themselves at first are easily overcome, and Fränckel was able fully to substitute the claims made by Florence for this new method of investigation. He was able to recognise blood corpuscles, their form, colour, nuclei, etc., when blood was present on opaque objects in a very thin layer, and even to measure the size of the corpuscles in a stain which dated from the year 1876.

The advantages of the method in medico-legal cases is evident, since by it we may be able to identify blood stains on opaque objects which would escape detection with the naked eye, and which, owing to their minute size, would not afford sufficient material for the application of other tests. Of great interest also is the fact that Fränckel was able by reflected light to obtain good absorption spectra,—in recent stains the spectrum of oxy-hæmoglobin and in older stains that of hæmochromogen. The new method is one which promises to prove of great importance in forensic medicine, and no doubt will be submitted to further investigation.

The Diagnosis of Death by Drowning in relation to Cases in which Resuscitation has been attempted by means of Artificial Respiration.

An insane person died suddenly in a bath while the attendant was absent from the room for a few minutes. Efforts to resuscitate the patient were unsuccessful. At the post-mortem examination the typical appearances of death from drowning were found. Later on, however, it was ascertained that drowning could not possibly have been the cause of death, owing to the position of the deceased in the bath, although some water probably passed into the air passages. The possibility that death was due to syncope and that water had subsequently gained access to the air passages, caused Schulz, who reports the case, to investigate the question whether under such circumstances artificial respiration was capable of causing on a dead body, the post-mortem appearances of death from drowning. His experiments enables him to answer this question in the affirmative. Water was poured into the air passages of a body placed in a sitting position and thereupon artificial respiration was carried out. Not only were the anatomical appearances of death by drowning thus produced, but also there was found, by means of the cryoscope, dilution of the blood of the left side of the heart as well as of the fluid in the lung substance, while there was also present as a rule hæmolysis of the blood in the heart on the left side. These results show that if artificial respiration has been performed on a dead person into whose air passages water may have gained access after death, then the signs in the lungs and heart which one is accustomed to regard as diagnostic of drowning can no longer be relied upon.—*Vrtljschr. f. gerichtl. Med.*, Berlin, 1908, Heft 1.

THE INDICATIONS OF A NEAR DISCHARGE FROM FIREARMS CHARGED WITH SMOKELESS POWDER.

As a result of numerous experiments, Meyer has arrived at the following conclusions, with reference to the recognition of a "near" discharge of a firearm loaded with so-called smokeless powder:—(1) The most valuable evidence, as is the case when ordinary powder has been used, consists in the blackening produced by the smoke around the wound, while, in addition, there is often a characteristic greyish-green or light yellow discoloration produced. This blackening may be absent when the discharge takes place at distances over 6 in., but, on the other hand, it may be present if mixed powder is used or if the skin is moist, when a weapon is discharged at a distance of 16 inches. The blackening is not so easy to wash away as in the case of ordinary black powder, and thus may still be recognisable even after submersion of the body in water. (2) Even in the absence of any blackening by smoke the deposit of products of combustion on the unburnt hairs may be seen and indicate a near discharge. (3) When, in the absence of blackening of the skin by smoke, there is blackening of the walls of the bullet track, together with undermining and destruction of adjacent tissues, then the near character of the discharge is indicated, in all probability a discharge with the muzzle in contact with the skin. (4) CO is almost constantly found to be present in the tissues surrounding the wound, although its absence does not contra-indicate a near discharge. (5) With nitro-powders signs of burning and singeing are absent as well as the tattooing produced by unconsumed particles of powder which is such a characteristic appearance when ordinary black powder has been used.—*Vrtljschr. f. gerichtl. Med.*, Berlin, 1908, Heft 1.

DISEASES OF THE EYE.

UNDER THE CHARGE OF

GEORGE A. BERRY, M.B., F.R.C.S.Ed.,
CONSULTING OPHTHALMIC SURGEON, EDINBURGH ROYAL INFIRMARY;
AND
W. G. SYM, M.D., F.R.C.S.Ed.,
OPHTHALMIC SURGEON, EDINBURGH ROYAL INFIRMARY.

A POINT IN REGARD TO THE PUPIL REFLEX.

IN several pathological conditions the presence of the pupillary reaction or its absence becomes a question of great moment. In hemianopsia, to take one particular example, the existence of a pupillary reaction when the light is thrown upon the blind half of the retina, has been held to prove that the lesion causing the loss of part of the field of vision must be situated above the corpora quadrigemina, outside the reflex arc of the pupil, that is to say: the absence of the pupil reflex when light is thrown upon the blind half of the retina proving in similar fashion that the lesion must implicate the optic tract. This test, associated with the name of Wernicke, is a very difficult and uncertain one to make, for two reasons, in particular, namely, that it is difficult to insure that no light whatever shall fall by reflection or otherwise upon the seeing half of the retina, and that even in normal conditions the pupil reaction is very feeble indeed unless one stimulates the retina at the macula or in its immediate neighbourhood. If light is allowed to fall close to the macula it is difficult to make certain that it does not flow over to the other side, and if a distant portion of retina is employed, the reaction, even in a normal eye, may not "come off." Whether light falling at any or every point on the retina is capable of producing response from the iris, or only light which falls at or in the immediate neighbourhood of the macula, is obviously then a point of much importance, and this has recently been carefully gone into by Hess. The question is one requiring more careful investigation than the rough clinical test of covering the eye with the hand and then removing the cover, because not only does light entering through the pupil reach every part of the retina, but some of the light which falls upon iris and even upon sclerotic makes its way through to the sensitive retina, thus complicating the matter. In his experiments, Hess, realising that the diffused light which strikes upon the macula forms an element which cannot be eliminated, minimises the error (if he does not altogether do away with it) by maintaining this as a constant quantity. He makes the macula the centre of a circle, the distance from this to the normal blind spot its radius, and he focuses the light at different points along its circumference. When the light then is focused on the blind spot, it is only the diffused light which impinges on the macula which can bring the reflex; when the focused light is directed to any other point on the circumference of this circle, the amount of diffused light being exactly the same, the pupil will remain of the same size as it was when the blind spot was the selected focusing point, if the macular stimulation alone is the cause of the reflex. This he found to be the case, showing that it is only light falling within a circle of 3 mm. radius whose centre is at the macula which ever produces a pupillary reaction: outside it the retina appears to possess no pupillomotor fibres at all.—*Arch. f. Ophth.*, Leipzig, Bd. lviii. Parts 2 and 3.

RABBIT'S BILE IN THE TREATMENT OF ULCERATION OF THE CORNEA.

It has now been known for some time that the bile of the rabbit has a decided bacteriolytic action, in particular apparently as directed against the pneumococcus. Curiously enough, the bile of the rabbit is decidedly superior in this respect to that of man, dog, rat, or goat. It is believed to be in the bile salts that this virtue lies. Gabrielides seems to have been the first to attempt to make use clinically of this property of rabbit's bile, and Morax (Paris) has further investigated the matter. In some cases of infection of the eye by the pneumococcus he employed the bile just as it was, in others he made use of a 2 per cent. solution of taurocholate of soda, which makes a convenient substitute. In all the cases, whether conjunctiva or cornea was the point of attack, the application appeared to be decidedly valuable, and certainly reduced the abundance of organisms. (In one case of infection with the *Bacillus pyocyaneus* in which he employed it, on the other hand, it was totally without beneficial effect.) The application of bile is evidently somewhat painful, and though it is beneficial, Morax does not suggest that it should be relied upon by itself: he recommends it as an adjunct to other remedies.—*Ann. d'ocul.*, Paris, 1907, November.

Disease of the Hypophysis Cerebri; Anomalies of Growth associated with Temporal Hemianopsia.

It is not so much true acromegaly as other abnormalities of growth to which Uhthoff refers in a paper recently read before the Heidelberg Ophthalmological Society in supplement of a paper published by him in 1897. In three cases now published the principal feature associated with alteration of the fields was an abnormal fatness of the body along with slight gigantism, but not true acromegaly. He asks the question, answering it for his own part in the affirmative, whether in presence of temporal hemianopsia, obesity, and abnormal bodily development, one is justified in diagnosing a tumour in the region of the pituitary body. It is not pretended by the author that he was the first to notice this undue obesity : in certain cases with similar symptoms the hypophysis has, however, been found unaffected, unless perhaps by pressure starvation. This corpulence is found to exist much more frequently in younger patients than in older ones. Brissaud and Meiger consider that exaggerated activity of the hypophysis leads to giant growth in children, to acromegaly in adults, and later in life to thickening of the soft parts.—*Ber. d. Ophth. Gesellsch.*, Heidelberg, 1907.

Acromegaly and Myxœdema.

Gourfein-Welt publishes a case which has some bearing upon the very interesting question of the relationship between these two diseases. That they are allied has been known or suspected for some years now; indeed, some have thought that the want of development of the thyroid, giving rise to symptoms of myxœdema, might have led, in the cases in which indications of both diseases have been simultaneously present, to a compensatory hypertrophy of the pituitary body, with consequent development of signs of acromegaly. Some of the results of actual experiment and some of the clinical observations made by numerous workers certainly seem to point in this direction. The authoress relates a case which, so far as it goes, tends to support this theory. It was that of a woman, æt. 47, with symptoms both of acromegaly and of myxœdema: hair and teeth were coming out, hands and facial features had become larger and coarser, the voice had changed, memory was defective; the skin was thick and infiltrated. Vision had been failing for a year, and it was found that the right eye was blind, while the left showed temporal hemianopsia. Thyroid extract caused great improvement in the general condition and in the visual symptoms in particular, for central vision rose and the temporal part of the field was partly regained. Unfortunately the state of the right eye was too far gone for much improvement to take place.—*Arch. d'oph.*, Paris, 1907, September.

An Unusual Cause of Recurrent Conjunctivitis.

Every ophthalmic surgeon recognises cases of recurrent conjunctivitis, returning without any apparent reason whatever, the mucous membrane being sometimes free from all bacterial growth. Risley mentions two cases in which the cause of this condition seemed fairly clearly proved, though it is a very unusual one. The first was that of a lady, æt. 25, who cannot come into the neighbourhood of a horse without an access of what one might call asthma, analogous to "hay fever." The nostrils becomes tuffed, there is persistent sneezing and profuse lachrymation. The eyes will remain red and painful for hours after even only a few minutes' proximity to a horse. Naturally this lady is an enthusiastic upholder of the automobile! The other case is also that of a young lady who presents exactly similar symptoms when in the immediate neighbourhood of a cat. Of course cases of cat-asthma are well known, but the reviewer has never traced conjunctivitis either to horse or cat. Is it possible that some other cases may have their origin in such "poisonous" plants as the *Primula obconica*?—*Trans. Am. Ophth. Soc.*, Hertford, Conn., 1907, vol. xi.

REPORTS OF THE MEDICAL SOCIETIES.

Edinburgh Medico-Chirurgical Society.—*May* 6, 1908.—Dr. James Ritchie, President, in the chair.—Dr. T. D. Luke showed—(1) a new dropper for ethyl chloride; (2) an open ether mask.—Professor Chiene described—(1) A simple method of preparing catgut; (2) how to demonstrate colour-photographic transparancies without a lantern.—Dr. H. Melville Dunlop read a paper entitled "Some Considerations regarding Pneumonia in Children, drawn from an Analysis of 500 Cases," which will appear in the Journal.

A clinical meeting, illustrative of the subject of Dermatology, was held in the Royal Infirmary on May 20, 1908—Dr. James Ritchie, President, in the chair.—Dr. Norman Walker gave a résumé of the work of the Skin Department of the Infirmary during the past sixteen months, with special reference to interesting groups of cases, and to those subjects at present attracting attention. He first referred to alopecia areata. This disease appeared to be about twice as frequent, relatively to the total number of cases seen, as in either London or Glasgow. This, he thought, supported the view that the disease is infectious. Favus was next referred to; it was notoriously common in Edinburgh, but he doubted whether many of his audience realised that he could have collected, as he wished, sixty cases to show. The disease in private practice can be cured readily enough; among the poor, however, it was frequently incurable. The reason for this was simply that the patients would not attend regularly. Favus could easily be stamped out if means could be devised to compel the children to attend hospital regularly. Impetigo contagiosa showed a definite epidemicity. In some months (not the same in each year) the disease was much more common than in others. Herpes zoster also showed a similar incidence. Lupus erythematosus was held by some authorities, particularly in France, to be tuberculous in origin. It was not held that the lesion was due to a local tuberculosis, but that it was caused by the toxins of tubercle bacillus located in a distant focus. Dr. Walker had tried von Pirquet's cutaneous reaction in several cases, but he only got one positive reaction. This, he thought, was strongly against the theory that the disease is tuberculous. He protested against the indiscriminate use of Calmette's reaction, as a patient on whom he tried it nearly lost the sight of one eye. Speaking of lupus vulgaris, he said that in using the X-rays he had learned the importance of patient, prolonged, and persistent treatment. He showed several cases which were practically cured after years of treatment. He regarded the use of oleate of mercury as occupying nearly as high a place in the therapeutics of lupus as the X-rays themselves. He had been struck by the number of times he had seen epithelioma develop in the course of the X-ray treatment of this disease. Several cases were shown to illustrate this. The appearance of cancer did not mean that the rays must necessarily be discontinued. It certainly was wrong, in his opinion, to say that if epithelioma developed larger doses of the rays were indicated. Molluscum contagiosum was not a very common disease in his series. He had noted one group of five cases of this disease in which all the patients had frequented the same public baths. Acne rosaceæ was commonly ascribed to digestive disorder; he was able to say that this was relatively rare in his cases. He thought there was a connection between this disease and seborrhœa. Regarding ringworm, he had not had the same success with X-rays in this disease as was obtained in Paris. Referring to the general question of vaccine therapy, Dr. Walker showed a severe case of sycosis which had been rapidly cured with vaccinations of his own staphylococci. In lupus, if tuberculin was to be of any use, it must be given in some way which did not necessitate the estimation of the opsonic index. His practice was to give $\frac{1}{1500}$ mgrm. of tuberculin every four weeks, and he was satisfied with it as an adjuvant to local treatment. Dr. GARDNER showed—(1) A somewhat rare form of erythema multiforme; (2) a patient with recurrence of ringworm of the scalp. In the first attack the small spore fungus, in this the large spore fungus, had been found.—Dr. CRANSTON LOW showed—(1) A patient who had previously suffered from an attack of dermatitis herpetiformis, and now had an attack of pemphigus foliaceus; (2) a case of commencing mycosis fungoides; (3) [for Mr. Miles] a patient with unusually well-marked rupia.—Dr. J. S. FOWLER showed an infant suffering from urticaria pigmentosa.—Mr. HENRY WADE showed specimens of—

(1) Hyperkeratosis plantaris; (2) mycetoma.—A demonstration of casts, photographs, etc., was also given in connection with the meeting.

EDINBURGH OBSTETRICAL SOCIETY.—*May* 13, 1908.—Professor STEPHENSON, President, in the chair.—Dr. MUNRO KERR, Glasgow, read notes on a "Case of Angular Pregnancy" which very closely resembled an ectopic gestation. Pain and hæmorrhage were complained of for some days, and a small tumour was discovered in the neighbourhood of the right tube. Two days later a decidual cast was shed, but no ovum. The ovum with remains of the cast was expelled a day or two after, and the swelling in the neighbourhood of the tube disappeared. He also described a case in which death of a fœtus *in utero* occurred at the thirty-sixth week. The fœtal heart sounds underwent a distinct change for a week previous to death. He also gave a communication on rupture of the uterus, with remarks on diagnosis and treatment, based on a series of fourteen cases. In most of his cases the pulse-rate had never been above 90, the temperature frequently subnormal, and the hæmorrhage not great in amount. He considered that plugging was the best treatment to be adopted in cases of rupture, and he preferred pan-hysterectomy to sub-total hysterectomy in cases where operative interference was required.—Dr. W. FORDYCE gave an account of an interesting case of a patient, æt. 48, on whom he had performed hysterectomy for fibroid tumour under spinal anæsthesia. On two previous occasions operation had been deemed inadvisable on account of prevailing cardiac symptoms, but, owing to the severity of the pain and profuse hæmorrhage, along with the expressed desire of the patient, operation was ultimately performed. About 15 c.c. of cerebro-spinal fluid were withdrawn, and 6 cgrms. of tropacocaine diluted with 5 c.c. of the cerebro-spinal fluid were injected into the subarachnoid space between the third and fourth lumbar spines by Mr. J. W. Struthers. The effect of the anæsthesia lasted for forty-five minutes, during which time the operation was successfully carried out, and the patient made an uninterrupted recovery. There were slight murmurs in the mitral and aortic regions, but Dr. Fordyce was of the opinion that the cardiac symptoms were more due to a general malnutrition than to any organic valvular lesion.

GLASGOW MEDICO-CHIRURGICAL SOCIETY.—*Friday, May* 1, 1908.—Dr. WALKER DOWNIE, President, in the chair.—Dr. JAMES ADAM read a paper on "The Pathology and Treatment of Atrophic Rhinitis." He also showed a series of patients and microscopic specimens illustrating the paper. The condition was usually associated with sinus disease and Abel's bacillus was frequently met with.—Mr. J. H. PRINGLE showed a patient after inter-ilio-abdominal amputation. The leg had been amputated for sarcoma, and recurrence took place in the ischium. The half of the pelvis (from the sacro-iliac synchondrosis almost to the symphysis) was removed. The patient did well, and there was no hernia afterwards. He got about, using a crutch on the side of the sound limb.—Drs. T. K. MONRO and LEONARD FINDLAY showed preparations from a case of general tuberculosis.—Dr. T. K. MONRO also read notes on a "Case of Hyperpyrexia in Rheumatism successfully treated by the Cold Bath."

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